THE RUBBER AGE AND TIRE NEWS

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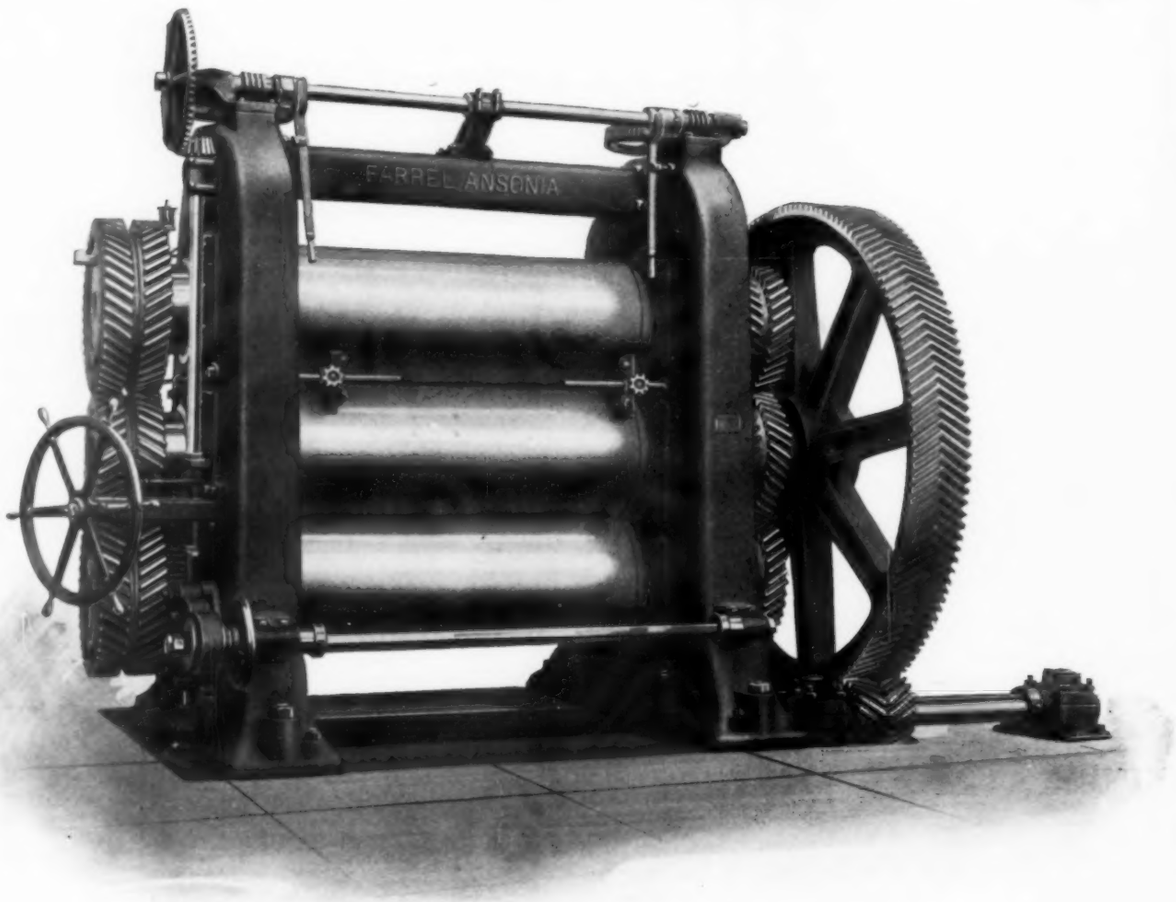

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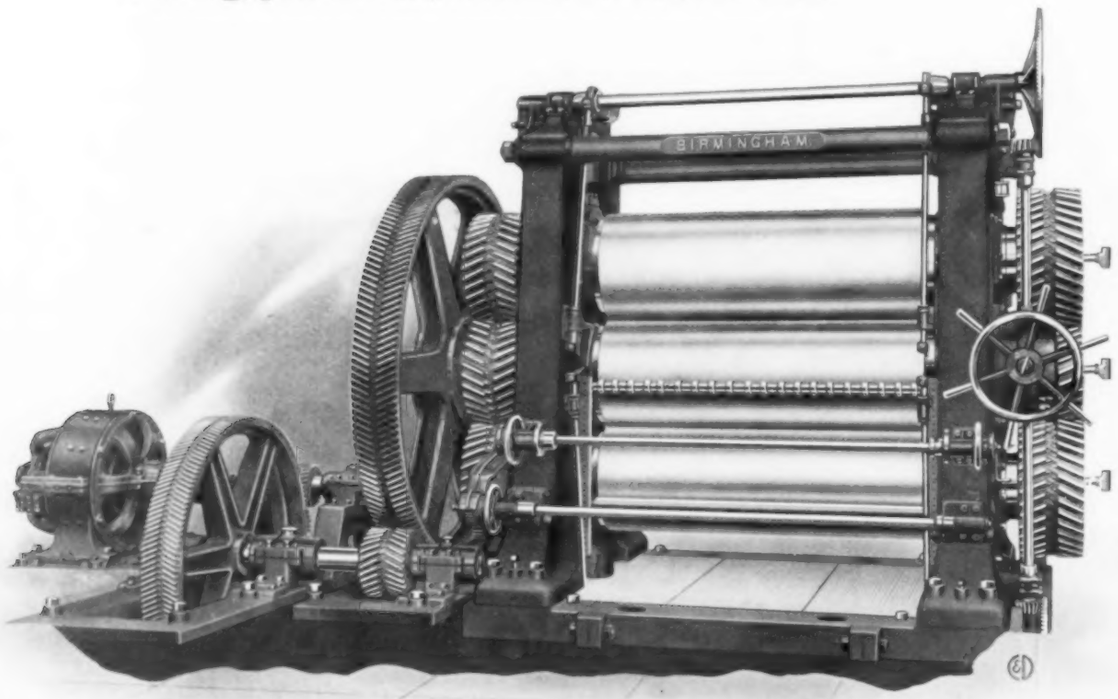

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THE RUBBER AGE AND TIRE NEWS

FEBRUARY 10, 1918 VOL. II, NO. 10

Member of the Associated Business Papers, Inc.

INDEX TO CONTENTS

	PAGE
Long Staple Cotton in the Southwest	425
Digest of Foreign Rubber Press	429
Design of Sole and Heel Plant	430
Technical Course in Rubber Manufacture	431
Editorials	435
The World's Rubber Industry	436
Items of Interest to the Rubber Trade	438
News from the Rubber Metropolis	439
Important Trade Happenings	440
Market for Manufactured Rubber Goods	441
The Fabric Market	441
Chemicals and Compounding Materials	442
The Crude Rubber Market	443
Scrap Rubber Market	443
American Rubber Patents	444
TIRE NEWS:	
Size, Inflation Pressure and Construction of Tires	445
Load Characteristics of Tire Factory	448
Hardware Manufacturers Organize for War Service	449
News of Tire Industry	450
Items of Interest to Tire Trade	451

THE GARDNER-MOFFAT COMPANY, Inc., *Publishers*

120 WEST 32D STREET NEW YORK

Room 308-310 Evening Star Building, Washington D. C.

SUBSCRIPTION PRICE: ONE DOLLAR PER YEAR. SINGLE COPIES TEN CENTS. CANADA: TWO DOLLARS A YEAR. FOREIGN: THREE DOLLARS A YEAR. COPYRIGHT, 1918, BY THE GARDNER - MOFFAT COMPANY, INC., PUBLISHERS.

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THE RUBBER AGE AND TIRE NEWS

Long Staple Cotton in the Southwest

By Theodore Wood

Considerable interest has been aroused during the last year concerning long staple cotton that is being grown in the Southwest and which is suitable for use in automobile tires. It is the purpose of this paper to describe this development in such a way as may answer questions which might naturally arise in the minds of the tire manufacturers when this subject is mentioned. We shall try to give a few reasons why this industry is destined to grow and why Arizona is sure to become one of the most important states so far as long staple cotton growing is concerned.

The three principal cottons used in the tire trade are known as Sea Island, Egyptian and Peeler. When the tire industry was in its early stages, the larger sized and higher priced tires were made almost exclusively from Sea Island cotton. The medium priced and smaller sized tires were made out of what is commonly called Egyptian. In recent years there has been a demand for tires at low prices which has necessitated the use of cheaper fabric than either Sea Island or Egyptian, and for this last class so-called Peeler cotton has been used. As the production of tires increased the demand for Sea Island cotton naturally increased also and it was found that a variety of Egyptian cotton, known as Sakellaridis or Sak, was a satisfactory substitute for Sea Island. Recent developments, notably the situation due to war conditions, have made it difficult to import Egyptian cotton, so that a new class of American—or Peeler—cotton has been used with more or less success in manufacturing medium and small sized tires.

Perhaps a brief description of these several types of cotton may not be out of place. The Sea Island cotton used in tires is grown largely in the States of Georgia and Florida and has a staple ranging from 1½ to 1⅝ in. in length. This cotton is especially strong and silky in its nature, and owing to its great flexibility makes a very satisfactory tire fabric.

Field of Egyptian Cotton at Sacaton Which Yields Over Two Bales Per Acre

What is commonly called Egyptian is a variety of cotton grown in Egypt, having a staple about 1¼ in. in length and has a distinct brown color. Sakellaridis, or Sak, is a recently developed variety of Egyptian cotton, being equal in staple to Sea Island, having considerably less color than ordinary brown Egyptian and is slightly stronger than Sea Island.

Peeler cotton, as known to the tire

trade, is grown in various parts of the cotton belt of the South, is white in color, ranging in staple from 1 to 1⅜ in., and has a great variety of characteristics, largely depending upon the section of the country in which it is grown. Some manufacturers of tires have refused to use any Peeler whatever, believing that it was not suited for the purpose, although recent large scale experiments have demonstrated that the right kind of Peeler cotton makes a perfectly dependable tire.

A Perfect Field of Egyptian Cotton

The total crop of Sea Island cotton ranges from 60,000 to 120,000 bales of 400 lb. each annually, and a very brief acquaintance with the tire industry as it exists today will be sufficient to indicate that there must be other sources of supply for this character of cotton to take care of the tire demand alone. It should be borne in mind in this connection, that before automobile tires were a factor in cotton consumption, the entire amount of Sea Island cotton was absorbed by the textile industry in fine dress goods, lace, thread and various other cotton products requiring great strength or fineness. It should also be understood that Sea Island cotton will not thrive except in certain districts in Georgia and Florida and a small section of South Carolina where the soil and climate are of the right nature. Many attempts have been made to grow this cotton elsewhere but never successfully. In the last four years the demand for Sak as a substitute for Sea Island has increased so rapidly that the proportion of this cotton grown in Egypt has risen from 10 per cent of the entire Egyptian crop until today approximately 60 per cent of all the cotton grown in Egypt is of this variety. This is something over a half million bales annually, or considerably more than five times the average Sea Island crop.

Activity of Boll Weevil

The boll weevil is a cotton pest which is more or less familiar to our readers, but for the sake of greater clearness we might explain that this insect, which lives exclusively on cotton, appeared in southwestern Texas a good many years ago and has made progress in a general easterly direction across the cotton belt, causing millions of dollars worth of damage to the crop in whatever section it infests, and up to the present time no satisfactory way of fighting this particular pest has been discovered, except that of planting varieties of cotton which mature early in the fall before the boll weevil has gotten in its worst work.

After the boll weevil made its appearance in the cotton states, and its habits were observed by the entomologists and members of the Bureau of Plant Industry—this being a branch of the Department of Agriculture at Washington—it became apparent that this pest, moving across the cotton belt, would ultimately reach the section of the country where Sea Island cotton was grown, and a knowledge of the habits of the insect and also of the characteristics of the Sea Island plant, made it possible for the Department to predict that the Sea Island crop was threatened with serious and permanent reduction, if not with total destruction.

In order to insure for the United States a domestic supply in the event of the Sea Island cotton disappearing as the result of the ravages of the weevil, certain men connected with the Bureau of Plant Industry set out to find some section of this country where a satisfactory substitute for Sea Island could be grown and where in all probability the weevil could not thrive. After a great deal of investigation and research, it was decided to experiment with various kinds of cotton seeds in the Salt River Valley of Arizona, and in 1902 an experimental station was established at Sacaton, Arizona. Experiments with these seeds and many plants were carried out with the greatest care over a period of ten years before a satisfactory plant was developed and it was thought wise to give it out to the farmers of that section for commercial growing.

Arizona as a Cotton Country

Let us state briefly some reasons why Arizona appears to be the most satisfactory place to grow cotton of this kind, which so far has been found. In the first place, there is plenty of good quality water. As the country is practically free from rains during the growing season, irrigation of the cotton can be easily controlled and timed for the best development of the plant and its fruit. In the second place, the general valleys now under cultivation in this State are practically level, insuring equal irrigation. Also the soil is of practically the same nature, being rich silt deposits of considerable depth, containing all the elements required for successful cotton culture except humus, which lack has been overcome by opening great irrigating systems and by pumping water from driven wells.

So fertile is this soil that on a restricted acreage at the Government Experimental Station at Sacaton, a crop of cotton has been grown each year, without rotation of crops, and with absolutely no fertilization, for nine years, and it is stated that each year there has been a larger yield per acre. Again, this State is free from destructive pests, and it is carefully safeguarded by rigid restrictions so that if the boll weevil, which has caused millions of dollars' worth of damage in the cotton belt, should get into this section of the country, he could hardly thrive, as it is arid, and moisture appears essential for his development, and furthermore, if there should be an invasion by this pest either natural or malicious, it would be simply a matter of cutting out cotton for a season and planting any of the innumerable crops which this climate and soil support. This would virtually starve the weevil out, as it cannot live on any food other than cotton.

Still another reasons why cotton culture has been successful in this section is that the farmers in Arizona, not being cotton growers and, therefore, having no traditions concerning cotton, were perfectly willing to receive instructions from the Government experts and to carry them out to the best of their ability. This open mind on the part of the farmers has been in no small measure respon-

sible for the success of the industry. In this connection it is well to point out that the average cotton grower of the South is a man of habit and is pretty slow to make any change in his methods, so that while the members of the Department of Agriculture who have been interested in cotton have persistently tried to educate the Southern cotton grower in the ways of fighting the boll weevil, by far the greater majority have paid no attention to the advice given, with the result that the present crop of Sea Island—which from the acreage planted would normally yield 120,000 bales—will probably not yield 60,000.

As foreseen by the department, the weevil in his march across the cotton belt has now reached the Sea Island district, and unless radical methods are adopted by the planters immediately, the Sea Island crop will dwindle and become an insignificant factor in long staple cotton production. Be it said, to the credit of certain gentlemen in the Sea Island district (who incidentally are more concerned with the selling of cotton than with its raising) that concerted effort is being made to "lock the door now before the horse is all but stolen."

Cotton Seed Experimentation

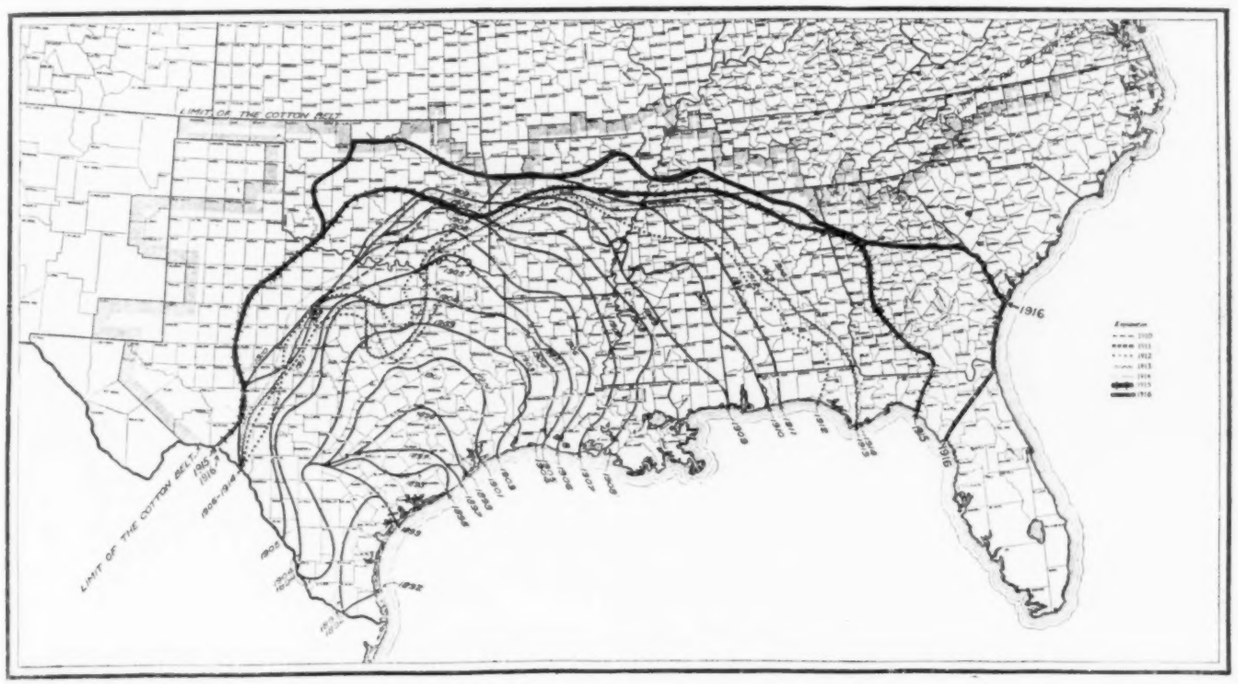
The early attempts to grow long staple cotton in Arizona were very discouraging, but after about six years of persistent effort wherein all kinds of seeds were experimented with, a type of cotton was developed from the so-called Mitififfi—or brown Egyptian seed, which seemed to have the characteristics desired. Contrary to the general supposition, Arizona Egyptian cotton which runs from 1⅜ inches to 1⅞ inches in length, is not grown from Sea Island seed, but has been developed by scientific horticultural methods from Egyptian seeds, yielding a staple of not more than 1¼ inches. An attempt to grow Sea Island in Arizona failed there as elsewhere outside the Sea Island district, but this seed from Egypt, where the soil, climate and general conditions more nearly approximate those of Arizona, was the one which gave the best results.

By a careful selection of a few perfect plants and by isolating and scientifically developing these few plants, a variety of cotton called Yuma was established. This plant has practically all the characteristics which make the fiber of value. The plant is sturdy, yielding an abundant number of bolls, and its fibre is long, strong, even in length and flexible; in fact, is in every way equal to the best Sea Island now used by tire manufacturers.

In 1912 the seed was first given to the farmers of Arizona, and local associations were formed wherein all the members were bound to abide absolutely by the methods of cultivation laid down by the specialists from the Department of Agriculture. The first crop amounted to some 375 bales, which was ultimately spread around in various cotton mills in the country, largely for experimental purposes. It was difficult each year, however, for the farmers to market their cotton to good advantage as they had had no experience in the selling of cotton, and it is proverbial that cotton mill agents are slow in taking up any new variety of cotton. When a new cotton appears on the market, the tendency for mill men is to let the other fellow do the experimenting.

However, some of this cotton fell into the hands of one of the largest American firms of cotton dealers who immediately recognized its value, and while they were doubtless not actuated by unselfish motives entirely, they nevertheless performed a real service for the Arizona cotton growers by widely advertising this new fibre.

The most serious difficulty in all Egyptian cotton so far, comes from the fact that cotton in that country is grown without intelligent supervision, and no sooner has a new and good variety been developed, than lax and unscientific methods have permitted cross-breeding of the plants and mixing of the seed, so that sure deterioration has been the fate of every good variety grown there. Unless Great Britain at once assumes



MAP OF BOLL WEEVIL AREA IN UNITED STATES

Note that the weevil is infesting practically the entire Sea Island district, including as it does the southern half of Georgia and the entire northern part of Florida. It may be asked why the boll weevil is not wiping out the ordinary American cotton grown throughout the entire cotton belt, if it is going to be so disastrous to the Sea Island cotton. The answer to this is that Sea Island takes longer to mature than any other variety grown in the cotton belt and the weevil does its worst damage late in the growing season, so that a grower of short staple cotton is able to get a crop even with the weevil, but that it would certainly be unprofitable to attempt to grow Sea Island cotton were cotton prices at anything like a normal figure.

more rigid control and establishes intelligent Government regulations, the present high type of Sakellaridis, which is familiar to us all, will go the way of its predecessors in Egypt and deteriorate to the point where its usefulness for tires will be gone.

Every possible precaution was taken by the Association under the direction of the Government experts to safeguard this new cotton in Arizona and prevent deterioration of the plant. New gins were bought and set up at various points where this cotton was grown, and the seed was gathered, cleaned and stored with the greatest care. Each year a certain section of the most promising field was set aside for seed production and the plants in this section were gone over five or six times during the growth of the plant and all inferior or off-type plants were rogued out. In this way a supply of pure, high-grade seed has been assured from year to year.

INDIAN WOMEN PICKING COTTON AT SACATON

Effect of War on Production

In 1914 the war broke out, and when the "Buy a Bale" movement was in full blast, the courage of the Arizona cotton growers began to ebb as they were obliged to sell their cotton at a considerable loss, as indeed were all growers of cotton everywhere who could not afford to hold it over. The result was that the following year many of the farmers, who had been trying out some acreage with this new cotton, went back to cattle, alfalfa, grain and other known crops, as they felt that cotton was too risky a proposition; and this setback, combined with the lack of response on behalf of the cotton mills who had been approached, might easily have caused the farmers to abandon the whole business. However, the members of the Bureau of Plant Industry had been assuring these growers that eventually the value of the fibre would be recognized by the manufacturers of automobile tires, and that the demand for cotton of this character was growing so rapidly that this recognition must come to them soon.

When, therefore, a buyer from one of the leading tire concerns appeared in the Salt River Valley in the summer of 1916 and showed first-hand interest in the cotton, he was met enthusiastically by the greater part of the growers. This buyer was convinced that the fibre grown in Arizona had exceptional value from a tire standpoint and was prepared to offer on behalf of the company he represented every encouragement to the grower to increase the product. This company, namely, the Goodyear Tire & Rubber Co., Akron, Ohio, in addition to cooperating with the growers and the association and the Department of Agriculture, and financing many of the local growers, have themselves since taken over the control of a considerable acreage of some of the best land in the Salt River Valley, variously stated as being from 20,000 to 40,000 acres. They have formed a subsidiary company known as the Southwest Cotton Co., which has, in this past season, taken many acres of raw desert land, cleared off the cactus, sage and greasewood, levelled, ditched, planted and are now harvesting a very fine crop of this cotton.

Other eastern cotton mill interests have also seen the opportunity and recognized the desirability of encouraging the industry, and have to that end invested large amounts of money in opening up new land for the culture of this valuable staple,

Notable among these are the Connecticut Mills, large manufacturers of tire fabrics in both the United States and Canada, and it is stated on good authority that they control approximately 10,000 acres of land. The American Thread Company, which requires especially good cotton for its product has also interested itself in the development.

It appears at this time when both Sea Island cotton and Arizona Egyptian cotton are selling at about 75c. a pound—a price of more than three times the normal value—that the future of this industry is assured. It is not by any means a simple question to raise cotton economically in this section in competition with other cotton-growing countries. Labor in Egypt is plentiful and cheap, but land values relatively high, and in the South labor and land are cheap, although labor is no longer plentiful, and while it is difficult to secure enough local resident labor in Arizona at the season of the year when the greatest number of hands are required, namely, in the fall months for picking, there is an abundance of Indian labor from the Reservation as well as contract labor used on various crops throughout the West and Northwest, which can be transported from place to place and brought to Arizona in the cotton-picking season, which ordinarily is later than other harvests in the West.

From the variety previously referred to as Yuma cotton, has been developed a newer type known as Pima, which possesses all the characteristics of Yuma and has in addition a greater length of staple. This cotton in its raw state has been pronounced by experts—both in this country and abroad—as in a class by itself. The harvesting has been done by Indian labor largely, which, although slow is very painstaking and results in a high grade or very clean cotton. The level land and equal irrigation controlled and properly applied has resulted in a much evener running fibre, that is to say, that there is less variation in the length of the individual fibres in any ripe boll of Yuma or Pima cotton than is found in any other long staple cotton in the world.

The writer has known of many fabric experiments being made with this Arizona Egyptian cotton for various purposes where the best cotton is required, and never has the new staple failed to equal in performance Sea Island or Sak, and usually shows itself to be much superior.

Durango Cotton

This paper so far has dealt entirely

with the Arizona Egyptian cotton, grown principally in the Salt River Valley of Arizona. There is another cotton which has come into prominence in the Southwest in the last few years, which is sometimes spoken of in connection with the Arizona Egyptian industry, namely, Durango cotton, grown in the Imperial Valley of Lower California. There are various reasons, however, why this cotton cannot be compared with Arizona Egyptian and so far has not proved satisfactory for the tire industry.

In the first place, it is shorter in staple, comparatively uneven in fibre, and there has been a lack of community method in the cultivation of it which has prevented the development of a single high-class variety; secondly, the water supply used for this section, while adequate at the source, has to be brought by the present method of irrigation through Mexican territory before being brought into the Imperial Valley in the United States, and as the Mexicans have prior right to one-half of the water running through this system, it will be obvious to anyone acquainted with the traits of our neighbors across the border, that if anyone on the irrigation canal must be short of water, it will not be friend Mexican. Furthermore, the water taken, as it is, directly from the Colorado River, without settling or filtering, carries normally 10 per cent to 25 per cent silt or mud, which fills the irrigation ditches, and clogs the soil, whereas the water used in the Salt River Valley is largely drawn from the Roosevelt Dam and underground wells, and carries practically no silt. As to a possible shortage of water in the Salt River Valley, it is stated by the engineers, that there is sufficient water stored behind the Roosevelt Dam to supply the irrigated section of the Salt River Valley for three years, should there be no further rainfall in the watershed feeding this dam.

The present year has brought the highest prices for long staple cotton that have been known since the Civil War, largely due to the fact that freight shipments from Egypt are practically shut off, whereas the demand for staple cotton of all kinds in this country has never been so active. It is confidently expected by those interested in cotton culture in the Southwest that the impetus given by the present unusually high value will so encourage the growth and increase the acreage in that section of the country that by the time the Sea Island crop shall have been seriously diminished, the new section of the country will be able to furnish enough cotton of the right character to replace the Sea Island crop.

There have been some individual instances where a complete failure has been made in Arizona, but these instances have been the result of neglect of elementary rules and have been object lessons to the other farmers, and undoubtedly the mistakes that have caused these failures will not be repeated in years to come. Too much cannot be said in recognition of the great services rendered to the textile industry as well as to the State of Arizona by the foresight and thoroughness of the Committee of the Bureau of Plant Industry in the Department of Agriculture, who have made this experiment and kept at it until it has been brought to a successful issue. Furthermore, these experiments in the Southwest should demonstrate to the Southern cotton planters as nothing else could, that the wisest thing for them to do is to listen to the advice of the Washington experts and then follow it.

Digest of the Foreign Rubber Press

The India Rubber Journal (London), January 19, 1918

Netherlands War Profits Tax.—There is still some uncertainty as to the extent to which rubber plantation companies are liable to this tax. The Dutch Government's ordinance does not give the method to be adopted in computing profits which are considered, to be the result of the state of war. In this respect everything is left to the decision of the Inspector of Taxes, subject to the Court of Appeal.

Some time back the International Rubber Association of the Hague, Holland, addressed a letter to the Dutch Minister of Finance, emphasizing the point that increased profits of rubber plantation companies were due to an increased crop over the average of the pre-war years, and increased profits arising from rubber could not be considered as war profits, inasmuch as the prices made during the war were generally lower than the average for the three years prior to the outbreak of the great conflict.

Some of the Dutch tax inspectors appear to have taken another view, urging that all profits made in excess of the average of the three pre-war years are liable to the new tax. They further urge that if there had been no war, the price of rubber would have gone down to a very low level, and that, therefore, the average price of the pre-war years cannot be taken into account. The Courts of Appeals will have to decide the point.

Several Dutch rubber companies have declined to accept the view of the tax inspectors, and refuse to pay any War Profits Tax unless their rubber was sold at higher prices than in the pre-war years. Up to the present no decision has been handed down by the courts.

Some Dutch companies have thought it advisable to come to an agreement with the Inspectors of Taxes on the basis that if rubber was sold in excess of 3.10 florins per kilogram f.o.b. Batavia or Medan, such excess should be subject to tax.

It is probable that the authorities in Java and Sumatra will endeavor to come to a similar agreement with rubber planting companies in the East.

Adulteration of West African Rubber.—New steps are being taken in Nigeria to put a stop to the adulteration of crude rubber. The Adulteration of Rubber Proclamation has been repealed, and a new Adulteration of Produce Ordinance issued, which give the Governor in Council power to make drastic regulations for the control of the trade. The appointment of examiners is also in contemplation.

In the ordinance, " to adulterate " is defined as meaning to falsify, deteriorate, or increase the apparent bulk, or conceal the inferior quality of produce by the combination, admixture, or addition therewith or thereto of some foreign, superfluous or inferior substance, matter or thing, whether deleterious or not, or by the use of artificial means, and includes abstracting from produce part of it so as injuriously to affect its nature, substance or quality, or soaking or manipulating it so as to increase its bulk or weight.

Scarcity of Rubbers in Birmingham.—The Birmingham correspondent states that the scarcity of rubber footwear in his city dominates the situation in the retail trade. Dealers are left with only a few odd sizes; the standard sizes have all been sold and buyers would invest, if they could, almost regardless of cost. Some relief is coming from imports from America, particularly from Boston.

Birmingham has a demand for rubber footwear almost peculiar to itself, in view of the fact that the munitions factory workers use large quantities of " rubbers " because of the safety they offer in rooms where friction from nailed boots might cause disaster.

Design of Sole and Heel Plant

By C. S. Redfield

In laying out a factory for the manufacture of soles and heels, care should be taken to allow for future development. It is also important that the stock should travel through the factory, in one direction only, as much as is possible. There should be no retracing operations.

In the design of plant shown (not drawn to scale), the building is one story with saw-tooth roof construction. The mills and calender all are motor driven, one motor driving two mills, and being placed between them. Only plantation rubber is used, which does away with all washing and drying. Reclaimed stock is purchased and not made at the plant.

Power plant development takes place in direction *X*, boiler additions in direction *Z*, mill development takes place in direction *Y*.

The section of the spur track, *A*, is elevated so that the car can be opened and coal dropped ready for placing in the boilers. All goods by freight are received at *B*, by express delivery at *C*. All goods shipped by freight are loaded at *D*, express shipments all made at *E*.

The room *F*, containing the compounding materials is kept fairly warm, so as to keep the compounding materials dried out. The room *G*, containing stored crude rubber and shoddy, is kept as dark and cool as possible, to eliminate the action of light on the gum.

The compounds are put up in room *H*. One man usually cuts the gums and the other weighs the compounding materials. The compounding materials to be weighed are placed in bins or barrels, along the bench *N*, while the gums to be cut are in rack *O*. After the batches are put up they are placed at *P*, in front of door *Q*, from which place they are delivered to the mills as wanted. The empty pans are returned through door *R*.

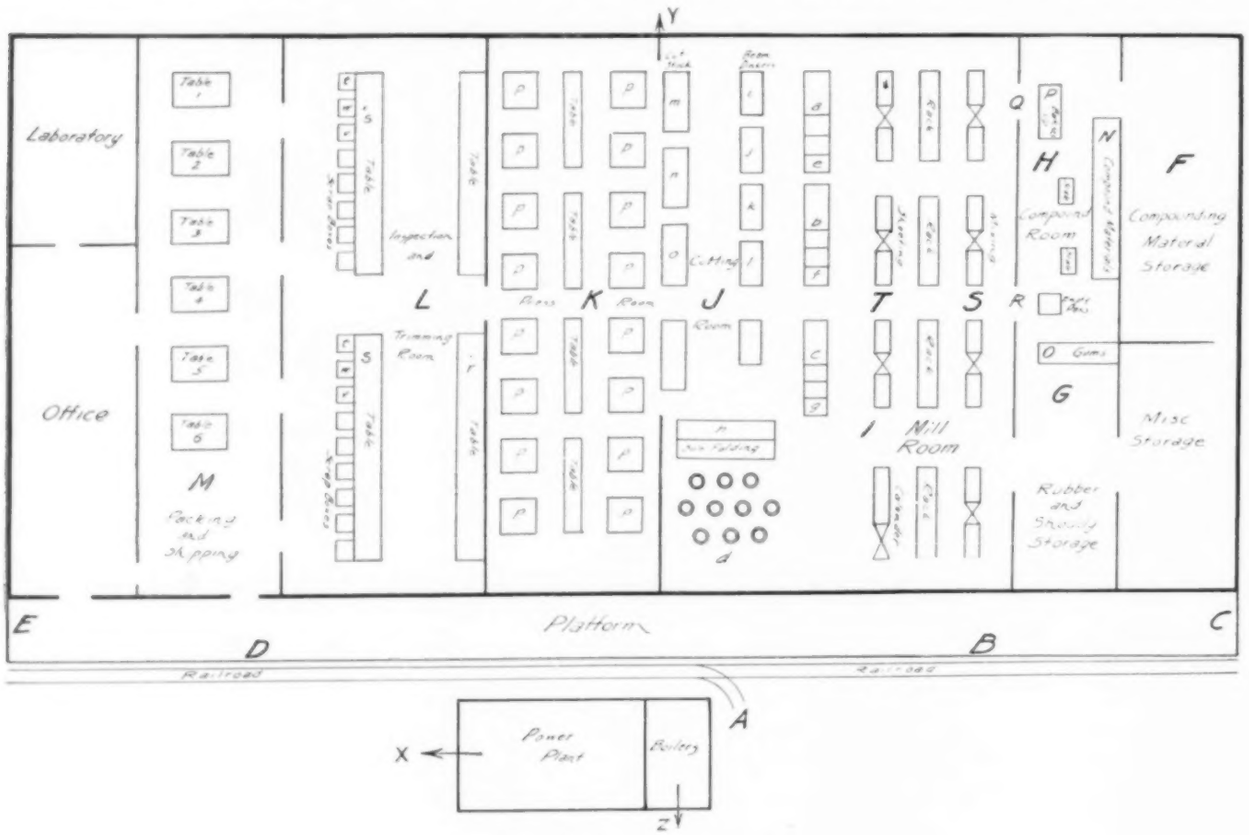
The mixing and sheeting are done in room *I*. The mixing is done on mill line *S*. After the stock is mixed it is placed in the racks between the two mill lines. Sheeting for heel blanks is done on mill line *T*, while the calender at the end of the line sheets stock for sole blanks, the two adjacent mills serving as warming mills for the calender. The sheeted stock for heel blanks is placed in the racks, *a*, *b*, *c*. Sheeted stock for sole blanks is placed at *d*.

The dieing out of blanks takes place in room *J*. The sheeted stock for heels being removed from the racks *a*, *b*, *c*, and the scrap being placed in metal boxes *e*, *f*, *g*. The rolls of sheeted sole stock, *d*, are folded on table, *h*. The stock is cut on the beam dinkers, *i*, *j*, *k*, *l*, etc., and piled on tables, *m*, *n*, *o*, etc., after cutting. These tables also hold the balances for weighing the blanks.

The vulcanizing is done in room *K*. One man running each press. The stock is delivered to the pressman and removed as soon as cured, use being made of the tables in the center of the room for blanks and cured goods.

The inspecting and trimming is done in room *L*. The cured goods from the presses are delivered at table *r*, where they are inspected. The inspectors, in turn, deliver them to the trimmers at table *s*. Scrap boxes *t*, *w*, *v*, etc., are placed in front of every trimming machine, the scrap stock, or flow, running through a chute to the boxes.

The trimmed goods are taken at once to the shipping room, where they are sorted for size and style and placed on tables, ready for packing.



Layout of Sole and Heel Plant

Technical Course in Rubber Manufacture

By H. E. Simmons, M.S.

Professor of Chemistry in the Municipal University of Akron

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SECTION XV

The Manufacture and Use of Organic Accelerators—*Continued*

In the minds of some people there seems to exist a misunderstanding in regard to the terms "accelerators" and "catalysts." Therefore it does not seem out of place here to point out the true meaning and correct use of the two terms.

Brezelius knew that hydrogen peroxide, if allowed to stand by itself, decomposed very slowly into water and oxygen. He also knew, however, that if to this hydrogen peroxide was added a small amount of finely divided platinum, a rapid decomposition of the peroxide took place and a great volume of oxygen was liberated.

He went further and found out that the platinum was not changed in itself in any way and that a small amount of platinum was capable of transforming an indefinite amount of hydrogen peroxide into water and oxygen. The two elements, hydrogen and oxygen, will remain mixed together at ordinary temperature almost indefinitely without any chemical union, but if a little platinum sponge is introduced into the mixture, the union immediately takes place, yet the platinum remains unchanged.

Sulphur dioxide does not combine with oxygen under ordinary conditions but in the presence of platinized asbestos, the two react and form the anhydride of sulphuric acid, thus the production of sulphuric acid today by the "Contact Process."

By these three examples it will be seen that certain reactions are made to take place under certain conditions, by the addition of what might be regarded as a foreign substance. This foreign substance is necessary to change the speed of the reaction and is not changed in the least by it as far as we know. Such substances Brezelius called "catalysts," their action he called "catalytic" and the phenomenon "catalysis." Catalysts will not incite reactions to take place which would not take place at all but they do wonderfully affect the speed of these reactions.

Action of Catalysts

It has been suggested that these catalysts, in effecting their work, form intermediate products which are very unstable and break down giving the products of the reaction and the renewed catalyst. Such intermediate products have been proved to exist and to these has been given the name "pseudo-catalytic phenomena." Ostwald however proposes the idea that they act like a lubricating oil in a rotating wheel. It turns very slowly and with great difficulty when oil is lacking but when it is added, the wheel turns freely yet the oil has no part in the movement. Here will be seen the analogy to catalytic action.

Euler has advanced the hypothesis that the velocity of a reaction depends upon the free ion concentration and that catalysts have the power of modifying this concentration, for we have, beside these catalysts which increase the speed of a reaction and are called "positive catalysts," those which retard a chemical change and are called "negative catalysts." Here we have set forth the true conception of catalizers, namely substances which may hasten or retard a chemical change and yet are not themselves affected in any way.

The term accelerators has quite a different meaning and application from a chemical point of view. In the first place, they only increase the velocity of the chemical changes and secondly they may or may not be affected chemically themselves.

In the rubber industry, therefore, we should refer only to accelerators, for in the vast majority of cases, the substance which is added to increase the speed of vulcanization is in itself changed also.

Accelerators

Only recently did it occur to the rubber chemists that it was possible to cut down the length of time of vulcanization, without increasing the steam pressure, by introducing into the rubber very small amounts of organic substances which would act as accelerators. Once tried and the results observed, the commercial importance of the practice was immediately grasped.

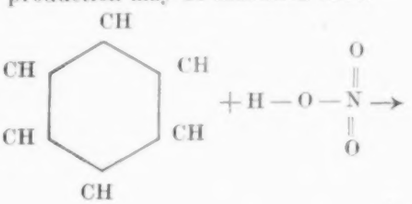
The introduction of these substances was suggested from the fact that synthetic rubber, or caoutchouc was very difficult to vulcanize, as is also acetone extracted rubber. This led to the study of ways to vulcanize the synthetic product and to the study of the acetone extract from Para with the result that nitrogenous bodies were found in the extract and the introduction of these into caoutchouc shortened its time of vulcanization.

The work of research laboratories was directed toward the producing and perfecting of substances and learning also how they might be used. It is in the midst of this kind of work that we find ourselves today. In fact we do not know very much about this new line as yet and we must still be very modest in our claims. Many organic substances have been experimented with in this connection and new ones are being recommended and placed on the market every day. Some of them appear under their true chemical title while others are disguised under trade names. Just last week this laboratory received one from a commercial house with the request that some experimental work be done with it and stating that they had not named it as yet.

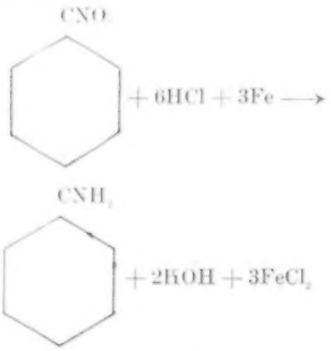
Several theories have been advanced as to the part which these substances really play in hastening the cure of rubber articles, but we shall leave those to a future section.

In this section we shall consider only a few accelerators and those are the ones in commonest use. It is held today that only nitrogen compounds will act as accelerators, and only those capable of being easily handled, easily incorporated into the stock, and possessing great enough stability not to produce "blowing" during vulcanization, may be used. One of the first substances of this kind to be used was aniline itself.

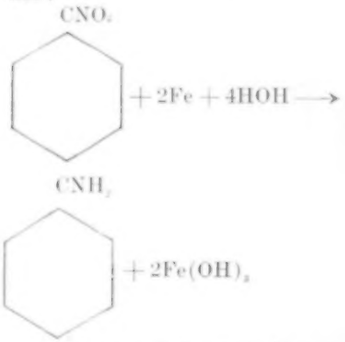
Aniline is made from nitro-benzene, which is made from benzene. This is effected in large cast iron vessels where a mixture of nitric and sulphuric acids is gradually poured into benzene. It is constantly stirred and the temperature maintained at 25 deg. During the latter part of the reaction the temperature is raised to from 70 deg. to 90 deg. The mixture is then forced into a conical tank when the acid mixture settles to the bottom and is drawn off. The nitrobenzene is washed several times with water and then distilled in a current of steam. The equation for its production may be indicated thus.



The nitrobenzene is then placed in a cast iron cylinder provided with a stirrer, a reflex condenser and an opening for introducing iron filings. Some water is placed in the cylinder, some iron turnings and hydrochloric acid. These are kept stirred while nitrobenzene is added. The reaction may be started by a jet of steam, afterward, however, it will maintain its own temperature for operation, in fact one must guard against its getting too hot. At the end of the operation we have aniline, aniline hydrochloride, ferric oxide, some unaltered nitrobenzene and other impurities. The main reaction which has taken place may be represented thus.



But in actual working conditions it requires only about one-fourth of the theoretical amount of hydrochloric acid, thus showing that after a certain concentration is reached, the reduction is then effected by the action of iron on water in the presence of ferrous chloride in the following manner:



After the reduction is complete, thick milk of lime is added until a distinct alkaline reaction is obtained when the mass is distilled with steam. The distillate will separate into two layers, the aniline being in the lower portion. This is often purified by redistillation. Aniline has a boiling point of 183 deg. to 184 deg. and a specific gravity of 1.024 at 16 deg. C. It is colorless when pure, but becomes brown in the air at a rate depending upon the amount of impurities present.

This aniline oil has been used as an accelerator by simply pouring the oil into the compound when it has broken down on the hot mills. The vapors which came off from the mill were very injurious to the workmen, giving them aniline poisoning. The aniline acts upon the nervous system and even a small amount will turn the lips bluish and produce the effect of drunkenness, the patient becoming very pale and being affected with loss of appetite. The use of alcoholic liquors seems to be very harmful to one suffering from aniline poisoning.

Factories in which aniline was being used went to great expense to install ventilating systems with large hoods over the mills. It hastens the cure of rubber articles; makes vulcanization possible in a shorter time and also with the addition of less sulphur, which, of course, cuts down the possibility of blooming. Aniline is a solvent for sulphur and that may have its influence upon shortening the time of cure as we know reactions take place more rapidly in solutions or homogeneous systems than in heterogeneous ones. The use of aniline alone has been practically abandoned today in favor of those less harmful to the workmen and those existing in a form more easily handled. It serves, however, as a base for the production of some accelerators widely used at present.

One of the first ones to be used and one that is still widely used is the product which is formed when aniline and carbon bisulphide are brought together. The principal product which is formed is diphenylthiourea thiocarbanilide. The reaction which takes place may be expressed thus:

To produce this substance in the pure form, Gatterman gives the following procedure:

"A mixture of 40 grams of aniline, 50 grams of carbon bisulphide, and 10 grams of finely pulverized potassium hydroxide is gently boiled for three hours in a water bath in a flask provided with a reflux condenser. The excess of carbon bisulphide and alcohol is then distilled off, the residue treated with water, the crystals separating out are filtered off and washed first with water, then with dilute hydrochloric acid, and finally with water. To obtain a high degree of purity, it is crystallized from alcohol."

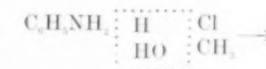
To produce the commercial product, all that is necessary is to place the mixture of aniline and carbon disulphide in large crocks or kettles in a warm place, where the escaping hydrogen sulphide will be carried away. The reaction will require perhaps thirty-six hours but it may be accelerated by the addition of sodium polysulphide. The yield is quantitative and there results a yellow, hard, crystalline mass. This is removed, pulverized, dried and is ready for use.

It should have a melting point of 154 deg. C. As an accelerator it is used in amounts from one-half to two per cent of the mixture.

In using this material, great care should be taken to reduce it to a fine powder. In grinding it tends to flake up, making it rather difficult to obtain the fine powder. If it is not reduced to a fine state of division, it will not be incorporated evenly in the rubber and will produce hard kernels of overcured rubber through the product.

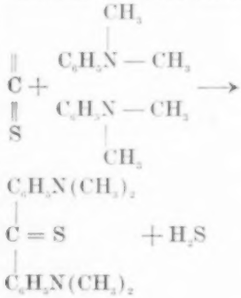
This substance shows its greatest effect in accelerating cure at the beginning of the process and thus great care must be used in milling it for if the rolls get too warm, vulcanization will begin. This same substance, thiocarbanilide, may be obtained in the market under the name of "Excellerex."

If aniline is added to hydrochloric acid, there results aniline hydrochloride, $C_6H_5NH_2HCl$. If this product is heated with methyl alcohol, a couple of reactions will take place and dimethylaniline will result as follows:



$$C_6H_5NH_2 + HOH + CH_3Cl$$
$$C_6H_5NH_2 + 2CH_3Cl \longrightarrow$$
$$C_6H_5N(CH_3)_2 + 2HCl$$

Now if carbon disulphide is added to this product, a reaction similar to that of aniline takes place and an additional product results.



This substance has properties like thiocarbanilide and is used in the same manner while the same precautions are observed. This substance, however, is much more active as an accelerator.

Tetramethylenediamine is an accelerator which gives fair results in the final product, yet is not to be regarded as rapid in its actions as some of the others.

This substance is produced during the putrefaction of animal matter and is called putrescene. Right in this connection we might call attention to the results of Eaton and Grantham's experiments in the rapid curing of rubber. It will be remembered that they obtained a fast curing rubber when they coagulated by means which would allow of the putrefaction of some nitrogenous matter, and the thought arises that this accelerating action may be due to the formation of tetramethylenediamine.

It may be produced on the commercial scale by first treating ethylalcohol with sulphuric acid, when the following reaction takes place:

$$C_2H_5OH + H_2SO_4 \longrightarrow C_2H_5SO_4H + HOH$$

with the formation of ethyl sulphuric acid. This substance then decomposes and yields ethylene thus:

$$C_2H_5SO_4H \longrightarrow C_2H_4 + H_2SO_4$$

If the ethylene gas is then passed into bromine, the ethylene bromide is immediately formed.

$$\begin{matrix} CH_2 & Br & Br-CH_2 \\ \| & + & \longrightarrow \\ CH_2 & Br & Br-CH_2 \end{matrix}$$

Upon treating the ethylene bromide with potassiume cyanide, the nitride will be formed.

$$\begin{matrix} Br & & CN \\ | & KCN & | \\ CH_2 & & CH_2 \\ | & \longrightarrow & | \\ CH_2 & & CH_2 \\ | & KCN & | \\ Br & & CN \end{matrix} + 2KBr$$

This nitride upon reduction with sodium in a hot alcoholic solution yields the tetramethylenediamine.

$$\begin{matrix} CN \\ | \\ CH_2 \\ | \\ CH_2 \\ | \\ CN \end{matrix} + 8H \longrightarrow$$

$$H_2N \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot NH_2$$

The substance is crystalline in nature and easily incorporated into the rubber.

Another product related to the one above is hexamethylenetetramine.

It is used in small quantities to dissulphur musts and wines. Here it is called urotoropine. However, in this use it is in connection with sulphur as is also its use in the vulcanization of rubber. This substance is a derivative of formaldehyde and results when formaldehyde is treated with ammonia. Its reaction is shown in the following:

$$6HCOH + 4NH_3 \longrightarrow (CH_2)_6N_4 + 6HOH$$

F. Hermann has given the following method for the production of this substance. To the formalin in a closed receptacle, he added ammonium chloride in quantity sufficient to liberate enough ammonia to effect the above reaction with the amount of formalin taken, then enough caustic soda to free this ammonia from the ammonium salt. As rapidly as the ammonia is liberated, it will react with the formalin and produce hexamethylenetetramine. This substance finds a wide use today as an accelerator of vulcanization.

Paraphenylenediamine also is an accelerator quite largely employed in the rubber industry today and yet it is a very poisonous substance. Great care should be taken where it is used to guard the welfare of the workmen. It is regarded as one of the rapid accelerators. It may be made in several ways. First by the reduction of aminoazobenzene dissolved in aniline, with hydrogen sulphide or tin and hydrochloric acid. Second, by heating paradichlorobenzene or parachloraniline with ammonia in the presence of a copper salt. (Ger. Pat. 204408).

Beginning with aniline in the first method, the following steps are necessary according to Holleman.

Aniline treated with sodium nitrite in the presence of hydrochloric acid gives diazobenzenechloride, thus

$$C_6H_5NH_2 + NaNO_2 + 2HCl \longrightarrow$$

$$C_6H_5N \cdot NCl + 2HOH + NaCl$$

When this is treated with aniline the diazoaminobenzenechloride is produced.

$$C_6H_5N \cdot N \cdot Cl + H \cdot NHC_6H_5 \longrightarrow$$

$$C_6H_5N \cdot N \cdot NHC_6H_5 + HCl$$

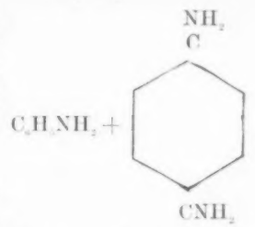
One of the most characteristic reactions of these diazoaminobenezenes is their easy conversion into isomers, or the aminoazo compounds. This is best carried out by adding aniline hydrochloride to a solution of diazoaminobenzene in aniline and warming the mixture on a water bath.

$$C_6H_5N \cdot N \cdot NHC_6H_5 \longrightarrow$$

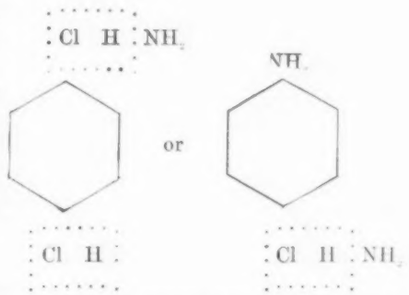
$$C_6H_5N \cdot N \cdot C_6H_4NH_2$$

Here the amino group is in the para-position to the azo group. When this compound is reduced there results aniline and paraphenylenediamine.

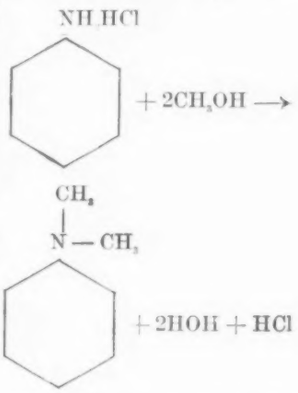
$$\begin{matrix} C_6H_5N & NC_6H_4NH_2 \\ H_2 \cdot & H_2 \end{matrix} \longrightarrow$$



The second method is very simple as indicated above.



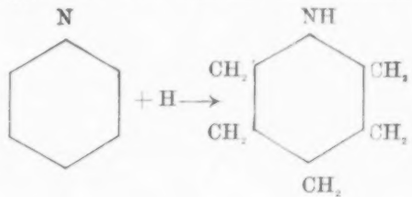
Under the trade name of "Accelerene," we find the substance paranitrosodimethylaniline. It may be made by heating aniline hydrochloride with methyl alcohol.



The hydrogen in the para-position of these dialkylamines is readily replaced by different groups. Thus the action of nitrous acid yields paranitrosodimethylaniline. This substance possesses a greenish color and should have a melting point of about 85 deg. C.

Piperidine and some of its derivitives have been used, but, owing to the poisonous nature of these substances and their odor, they are not used to any great extent.

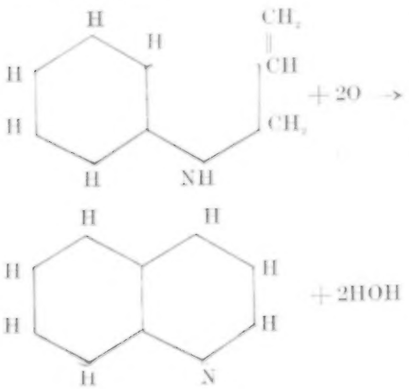
Piperadine is made by reducing pyridine with sodium and alcohol.



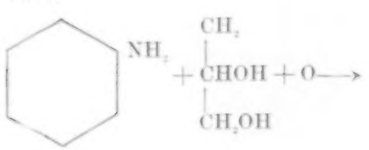
It is a liquid possessing an odor of pepper. It acts directly as an accelerator, however, upon vulcanization.

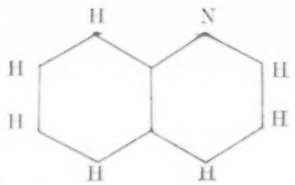
Quinoline and its derivatives are used in a satisfactory manner to a limited extent. Quinoline being the base of these, we shall outline only methods for the production of that substance. It is found in coal-tar and bone oil but is difficult to obtain from these sources.

Königs first synthesized it by passing allylaniline vapor over red hot lead oxide, when the following reaction took place.



Skraup's synthesis for quinoline as outlined by Perkin and Kipping is as follows: "Concentrated sulphuric acid 100 parts is gradually added to a mixture of aniline, 38 parts, and nitrobenzene, 24 parts, and glycerine, 120 parts, and the mixture is then very cautiously heated in a large flask (with reflux apparatus) on a sand bath; after the very violent reaction which soon sets in has subsided, the liquid is kept boiling for about four hours. It is then cooled, diluted with water, and the unchanged nitrobenzene separated by distillation with steam; soda is then added in excess to liberate the quinoline and the unchanged aniline from their sulphates and the mixture is again steam distilled. As these two bases cannot well be separated by fractional distillation, the whole of the aqueous distillate is acidified with sulphuric acid and sodium nitrite added until nitrous acid is present after shaking well. After heating, to convert the diazo salt into phenol, the solution is rendered alkaline with soda and again submitted to distillation with steam. The quinoline in the receiver is finally separated with the aid of a funnel and purified by fractional distillation." It is a liquid with a peculiar odor.





This, being a liquid, is not easily handled so it is converted into its sulphate and used most frequently thus. It is made by dissolving the quinoline in dilute sulphuric acid, when the sulphate $(C_9H_7N)_2H_2SO_4$ crystallizes out.

It has been found that when dimethylamine is added to carbon disulphide, an additional product is formed similar to thiocarbanalide, only no hydrogen sulphide is liberated during its formation. This product has a powerful accelerating action upon the rate of cure and produces good physical results also.

In addition to the ones mentioned above, many more have been tried; in fact, derivatives of all possible nitrogen compounds have been experimented with. Derivatives of the proteins of urea and ammonium compounds have all been recommended for this use.

Aldehyde ammonia, which is produced by passing dry ammonia gas into a solution of formalin, is a very good accelerator. It tends, however, to make the finished product harsh rather than of a velvety appearance.

Many substances which will accelerate must be discarded, for not acceleration of cure alone is a sufficient test for them. In addition to shortening the time for curing, they must also increase the physical properties of the rubber and thus reduce the deterioration of the finished products. So research along this line will continue even though at present we seem to be settling down to a few common accelerators.

Information Exchange

Stockinettes

Inquiry from W. N. W., Cal.—I am anxious to get into immediate communication with some manufacturers who can supply cotton stockinette fabric of much heavier weight than standard. I want stockinette or knitted fabric made from a heavy cotton yarn; I imagine a No. 6 yarn would be right. The fabric must be elastic in at least one direction and must be made from yarn that will stand a breaking test not under 16 and preferably 20 lbs.

Tire Building Machines

Inquiry from C. J. G., Conn.—Kindly supply us with names and addresses of concerns in a position to deliver good tire building machines.

Wants Garden Hose

Inquiry from P. S. & M., New York.—We have an outlet for thousands of feet of ¾-inch and 2-inch garden and water hose and want you to put us in touch with a rubber manufacturer who can supply us with large quantities of these goods.

Tire Companies Using Sakellarides

Inquiry from D. M. T. & A. Co., Iowa.—Can you give us the names of some of the rubber tire companies using Sakellarides cotton fabrics in the construction of their tires? We understand that practically all concerns using Sea Island cotton use Sakellarides as a substitute.

Latex Cups

Inquiry from the H. Co., New York.—Kindly put us in touch with concerns able to make metallic cups for collecting the latex from rubber trees.

Solid Rubber Truck Tires

Inquiry from W. A. S. Co., Maine.—As you will see from our letterhead, we handle an extensive line of pneumatic tires and automobile accessories, both wholesale and retail. It is our intention, in the near future, to add solid rubber tires for motor trucks to the lines we already handle. We are not familiar with motor truck tires and would appreciate any information you can give us on the subject.

Kindly put us in touch with the best manufacturers of solid rubber motor truck tires in this country.

Statistics on Rubber Footwear

Inquiry from G. W. N., New York.—Where can we secure reliable statistics regarding the extent of rubber footwear manufacture in the United States, and the percentage manufactured by individual concerns?

Solid Rubber Tire Fitting Press

Inquiry from W. A. S. Co., Maine.—We are going to put in a line of solid rubber motor truck tires and would appreciate your putting us in touch with makers of hydraulic presses and other equipment for applying permanent-base solid rubber tires to motor truck wheels.

W. D. MOFFAT
PRESIDENT

W. I. SEAMAN
TREASURER

ROBERT BROWN
SECRETARY

THE RUBBER AGE AND TIRE NEWS

H. M. WILLIAMS
EDITOR

W. M. MILNER
ASSOCIATE EDITOR

GEORGE NEWBOLD
BUSINESS MANAGER

H. B SEYMOUR
ADVERTISING MANAGER

Vol. II | February 10, 1918 | No. 10

SLOWLY, and without serious trade disturbance, business is adjusting itself to new conditions. War has already brought about great commercial changes, greater perhaps than are realized. Unprecedented prosperity has favored some lines, others have suffered from reduced production or restricted markets; still others have been forced to look for new fields of endeavor, and have usually found them.

The most significant feature of this readjustment is that business has demonstrated its strength and has passed through this trying period practically unscathed. Dun reports that in 1917 there were fewer failures in the United States than during each of the three preceding years, and that the total liabilities in 1917 were less than that of any of the preceding ten years. Among manufacturers, the number of failures was considerably below the average, although the liabilities stood above normal.

The rubber industry has been most fortunate during this period of transformation. When war was declared, business in the rubber lines was at high level. The rubber industry stood on a firm foundation, it had been experiencing seasons of unparalleled prosperity; surpluses had been accumulated. Financially it was sound, there were many orders on the books; its products were largely necessities used in time of war as well as during peace.

Some new orders came with the war, but not enough to disarrange general factory plans, for rubber mills have for years been accustomed to make rapid changes from one line to another that promised to be a better seller. As civilian orders fell off, due to the general adjustment, many factory hands joined the colors and the balance between orders and labor supply was well maintained, although wages rose.

While the volume of business, judged by the quantity produced has not increased, the higher price standards will show that few factories are going backwards on their sales accounts. The industry is very fortunate in having been able to continue on practically a peace basis.

The changes in the rubber industry have come so slowly and seemingly so naturally that one hardly realizes the import of the new order of things, but when looking back over the past months, one cannot help but see the dawn of a new era. The times, the war and other radical causes have started a new set of conditions such as business men have never experienced, and to which they will have to adapt themselves.

Look back and note a few of the radical—we do not say unnecessary—changes that have already taken place in our commercial and social life. Many materials and supplies are now difficult or impossible to obtain without priority orders; transportation is slow and uncertain over Government-controlled railroads; embargoes often prevent shipping; coal is distributed through a centralized Federal agency; work is forbidden on stated days without a special exemption order, generally impossible to obtain; certain staple foods must not be eaten on specified days each week; even our bread is made according to strange formulas—and this is just the beginning.

The country is patriotically bearing these conditions, deeming them a necessary part of the war program, all expect that real hardships may be required later and no one would avoid a needful sacrifice. Our whole system is changing rapidly. What will follow no one knows. One tendency is shown by Senator Overman's bill by which, if passed, the President will be granted extraordinary powers. The purpose of this bill as announced in its title is to authorize him "to coordinate and consolidate the executive bureaus, agencies, offices and officers and for other purposes in the interest of economy and the more efficient administration of the Government." It asks for sweeping powers such as have never been accorded to an American Chief Executive. Some thoughtful papers suggest that it will practically create a dictatorship, while our leading and most conservative financial authority suggests that "after passing it, Congress might better adjourn *sine die* and cut off a large expense."

The bill provides for a condition contrary to what American traditions have taught, for it delegates to the Executive, powers that have always been held by our national legislature. It must be remembered, however, that we are at war, and that it is now necessary to do many things that in time of peace would be considered absolutely radical.

The changes through the past few months have been as rapid as they have been revolutionary, but the months to come are sure to bring new phases, of which few have thought. What these will be, how they will alter business and industrial conditions, no one can tell, but the manufacturer, distributor and dealer will do well to give careful consideration to the new problems as they arise. How far we will drift toward socialism until the inevitable reaction comes, no man can safely predict, but sooner or later the pendulum will swing back and a reaction will follow, bringing with it new problems that may prove difficult of solution.

The World's Rubber Industry

The Rubber Growers' Association of London, has recently published some important statistics on the condition of the world's rubber industry, including the acreage devoted to plantation rubber. The figures are compiled from practically official sources, and such sources are set forth in respect to each country or locality. As in every instance the returns were derived from Government department's local authorities, full reliance can be placed in the published results.

The total acreage at the close of 1916 was 1,992,581, as follows: Malay Peninsula, 1,033,069 acres; Burma, 58,000; South India, 44,500; Ceylon, 240,000; British North Borneo, 31,500; Dutch East Indies, 529,712; Cochin China, 42,500; and New Guinea, 13,300 acres.

Small holdings in the Malay Peninsula are estimated to comprise from 10 to 20 per cent of the estate figures, and are put at 125,000 acres. This is the only instance in which the total is an estimated rather than an actual figure. Varieties of rubber other than hevea have been planted on 18,800 acres in the Dutch East Indies. Planted areas in Africa and the Philippines are not included in the compilation, while, of course, wild rubber is excluded.

Output of Rubber

In 1916 the actual output of rubber from the total area above given was 132,000 long tons (ton = 2240 lb.). In 1912 it was calculated that 1,500,000 acres had been planted. It is probable, however, that practically the whole of that acreage has now reached the bearing stage.

The output for 1917 is expected to reach 220,000 tons of plantation rubber, or about 246 lb. per acre. By the time the whole 1,922,581 acres are in bearing, a yield of 400 lb. per acre is predicted, with an output of about 357,000 tons per annum. Whether such a result will be actually achieved on a planted area of, say, 2,000,000 acres is stated to be somewhat doubtful, as no allowance has been made for losses by pests or disease, or for the closing down, for any reason, of any areas.

The general conclusion arrived at, however, is that in three years hence the limit will have been reached of the annual production of plantation rubber. This conclusion seems open to possible modification, inasmuch as many of the estates possess large areas suitable for planting, but on which, so far, such work has not been taken in hand. It is true, however, that a period of about five years would have to elapse between the time of planting and the commencement of tapping, so that if the whole of these unplanted areas were put under rubber during 1918 the annual production of 357,000 tons, as above estimated, would not be affected or increased until 1924.

Having regard to the steady growth in the consumption of rubber, and even assuming the ratio thereof will not increase—which is unlikely in view of the demands that will arise after the war—it appears probable that the world will find the available quantity insufficient for its needs three or four years hence.

Reporting from Amsterdam, Consul Frank W. Mahill says:

The extent of the Dutch Rubber industry and its remarkable growth, especially since the war began, are indicated by the number and capital stock of the rubber exploiting companies, as well as the volume of their products. These items are set forth in a recent publication issued in Amsterdam, from which the following particulars are derived.

The total number of Dutch rubber companies is 35, with a combined capital of 78,150,000 florins ($31,416,300). Of the number, 22 have their headquarters in Amsterdam (combined capital, 56,650,000 florins = $22,773,300), 6 in Rotterdam (11,600,000 florins = $4,663,200), 5 at The Hague (6,900,000 florins = $2,773,800), 1 at Batavia, Java (1,000,000 florins = $402,000), and 1 at Medan, Sumatra (2,000,000 florins = $804,000).

Most of these companies have been organized since 1908; only two were organized in the nineteenth century—in 1894 and 1896, respectively.

The total production of these companies during the past four years in half kilos (1.1 lb.) was as follows: 1913, 1,649,137; 1914, 2,497,241; 1915, 5,511,983; 1916, 9,122,164.

Increased Dividends Paid

Thirteen companies paid no dividends in 1915; 12 in 1916. Generally they were among the smaller companies. The other companies paid from 5 to 47 per cent in 1915 and from 5 to 60 per cent in 1916. The company which paid 47 per cent in 1915 and 60 per cent in 1916 was the Fransch - Nederlandsche Koloniale Cultuur Maatschappy of Amsterdam, with a capital stock of 500,000 florins ($201,000). The company with the largest capital (Nederlandsche Rubber Maatschappij of Amsterdam, 11,000,000 florins = $4,422,000) paid 2 per cent in 1915 and 7 per cent in 1916. The shares of this company advanced from 94 in 1914 to 199 in 1915 and 259 in 1916. The shares of the Fransch-Nederlandsche advanced from 200 in 1914 to 350 in 1915 and 418 in 1916. The shares of the "Serbadjadi" Sumatra Rubber Co., capitalized at 600,000 florins ($241,200), which paid dividends of 20 per cent in 1915 and 37 per cent in 1916, advanced from 100 in 1914 to 201 in 1915 and 336 in 1916; shares of Oost-Java, capital 1,200,000 florins ($482,400), dividend 24 per cent in 1915 and in 1916, advanced from 82 in 1914 to 146 in 1915 and 293 in 1916.

The shares of these four companies reached the highest figures in 1916, though the shares of some other companies advanced in greater proportion—for example, those of the Amsterdam Java Rubber Co., capitalized at 1,000,000 florins ($402,000), which paid no dividend in 1915 or 1916, were quoted at 7 in 1914, 38 in 1915, and 83 in 1916.

The increase in the production of plantation rubber in the Malay Peninsula continues, according to Consul Harry Campbell, detailed as vice-consul, Singapore, Straits Settlements, while prices for the year 1917 have remained wonderfully steady up to the present slump beginning a few weeks ago. There has naturally been much discussion among planters, buyers, and others interested in the rubber industry as to how long prices would remain steady or how long the demand for rubber at such prices would keep pace with the increasing supply.

Increased production in 1917 is shown by the following figures for shipments of rubber from the principal ports of the Peninsula for the first six months of 1917, with countries of destination, and the totals for the same period in the preceding three years. These figures exclude all foreign transshipments:

Destination	Shipments from— Singapore Pounds	Malacca Pounds	Penang Pounds	Port Swettenham (Sept. 27) Pounds
United Kingdom	24,844,780	2,201,114	12,810,867	20,040,139
The Continent	8,536,637	.....	47,067	.....
Japan	1,869,869	.....	.....	.....
Ceylon	152,334	.....	224,155	538,064
United States and Canada	66,560,632	.....	6,240,890	553,264
Australia	289,045	.....	.....	.....
China (Hongkong)	.....	.....	.....	47,052
Total, January-June, 1917	102,253,297	2,201,114	19,322,979	21,178,519
Total, January-June, 1916	62,176,305	3,442,134	15,863,767	25,043,779
Total, January-June, 1915	34,367,101	4,329,778	12,621,996	22,416,407
Total, January-June, 1914	18,511,130	2,548,819	10,407,734	22,228,203

The great strides in production and the great ascendency of the Singapore market over the other ports of the Peninsula are clearly set out, the Singapore figure for the first half of each year being nearly double that for the same period of the preceding year. The decrease in shipments from Malacca and Port Swettenham would appear to indicate that a large proportion of the rubber that was formerly sold at these ports and shipped direct to foreign countries is now coming to Singapore for sale and shipment. It will be noted that about 60 per cent of the shipments from Singapore for the first half year of 1917 went direct to America.

Strong Demand from United States

The demand for rubber has remained remarkably strong during the past two or three years, especially from American manufacturers, and only now has there appeared in the Singapore market a surplus for sale, with little interest shown by buyers. In past years there has been a decided rise in local prices during the fall and winter months, which makes the present decline all the more notable. This is perhaps due—although giving causes for market variations are at best largely guesswork—to a tendency among buyers to load up heavily earlier in the year in anticipation of a possible rise in prices at this time, as had occurred in previous years.

The great increase in direct shipments of rubber from Singapore to the United States is no doubt due to a certain extent to shipping conditions as well as the growing tendency of American manufacturers to buy in the Singapore open market through their own personal representatives stationed there. While shipping to London has steadily grown more difficult, tonnage to Pacific ports of the United States has become easier of late, so much so, in fact, that freights have been reduced considerably during the past few months. The economies and advantages of such procedure being manifest, it appears very probable that American manufacturers will in the future continue to make a large part of their purchases in this market for direct shipment to their factories.

Rubber Sold at Auction Sales

The prices realized for rubber at the weekly auctions of the Singapore Chamber of Commerce Rubber Association held fairly steady during the first half of the calendar year 1917, the slump occurring only within the past few weeks. The quantity catalogued for the auction of Nov. 16, 1917, was 1341 tons, of which 882 tons were offered and only 207 tons sold. The market throughout was flat, with very few buyers, and prices all round were considerably lower. From Jan. 1 to April 1 the market was steady, while between April and July prices gradually eased and continued at a lower level until the present month.

The Singapore weekly auctions have rapidly grown in importance since their inauguration some years ago, as shown by the following figures of quantities offered for sale and quantities actually sold. The rubber offered and sold at the 26 auctions held during the first six months of the calendar year 1917 is compared in the table below with the quantities bartered during the five preceding years. The figures indicate that the year 1917 will show a noteworthy gain over previous years. This increase is undoubtedly the result of, and in proportion to, the increase in the production of rubber in Malaya:

Year	Offered Tons	Sold Tons
1912	599	522
1913	1,695	1,508
1914	3,685	2,666
1915	11,167	7,322
1916	24,699	16,659
First half of 1917	18,581	11,983

The range of prices at certain Singapore rubber auctions held between Jan. 1, 1917, and Nov. 16, 1917, is shown by the following table, in United States currency:

Grade.	Price per pound—Jan. 4, 1917	Mar. 28, 1917	June 27, 1917	Sept. 26, 1917	Nov. 16, 1917
Sheet:					
Smoked—					
Fine, ribbed	$0.646	$0.686	$0.545	$0.545	$0.473
Good, ribbed	.589	.658	.505	.515	.442
Fine, plain	.567	.622	.493	.488	...
Good, plain	.522	.589	.448	...	...
Unsmoked—					
Fine, ribbed	.545	...	...	...	...
Good, ribbed	.471	.528	...	...	...
Fine, plain	.488	.553	.459	.511	...
Good, plain	.471	.511	.434	.459	...
Crêpe:					
Fine, pale, thin	.641	.681	.553	.536	.476
Good, pale, thin	.601	.652	.539	.522	.459
Good, pale, blanket	.567	.589	...	...	...
Good, brown, blanket	.528	.562	.450	...	...
Fine, brown	.567	.607	.493	.488	.324
Good, Brown	.493	.553	.488	.434	.298
Good, dark	.488	.488	.442	.420	.247
Barky	.397	.417	.417	.380	.182
Scrap:					
Virgin and pressed	.363	.471	.375	.383	.111
Loose	.330	.383	.264	.349	....

The highest prices realized at these auctions during the first half of 1917, as compared with the top prices for the like period of the three preceding years, are as follows:

Grade.	Prices per pound, first half of—1914.	1915.	1916.	1917.
Sheet:				
Smoked—				
Fine, ribbed	$0.600	$0.800	$0.86	$0.755
Good, ribbed	.575	.800	.83	.709
Fine, plain	.563	.787	.82	.629
Good, plain	.545	.780	.80	.590
Unsmoked—				
Fine, ribbed	...	.775	.81	.617
Good, ribbed	.549	.758	.71	.548
Fine, plain	.553	.766	.81	.584
Good, plain	.541	.724	.79	.556
Crêpe:				
Fine, pale, thin	.621	.897	.89	.738
Good, pale, thin	.592	.843	.87	.720
Good, pale, blanket	...	.831	.84	.720
Good, brown, blanket	...	.779	.82	.641
Fine, brown	.566	.800	.84	.652
Good, brown	.528	.762	.80	.601
Good, dark	.527	.728	.76	.556
Barky	.472	.668	.73	.528
Scrap:				
Virgin and pressed	.460	.511	.53	.488
Loose	.413	.541	.49	.431

Tire Standardization Necessary

It is probable that after the war a general standardization will be effected by European and American manufacturers on the main features of motor cars. The need of this is particularly apparent now in the confusion that has arisen because of the necessity in interchanging tires. American, French and British sizes now form three distinctive series. A British rim of 650-65 millimeters is not the same size as a French tire of 650-65 millimeters, and neither have the same measurements as the American equivalent. American tire manufacturers, however, make tires in millimeter sizes to fit European rims, but this necessitates the maintenance of additional molding equipment. Obviously universal standardization is required to correct this condition.

Licenses for Rubber Shipments to Canada

The War Trade Board has made a number of changes in the list of commodities that may be shipped to Canada under special licenses, placing a number of articles that heretofore could be exported in that manner in the list of articles, including crude and scrap rubber, for which individual licenses are required. At the same time, new application forms have been provided. There will hereafter be but one application form, known as Form X, but in addition there will be a number of supplementary information forms for each commodity.

Items of Interest to the Rubber Trade

Railroad Control and Motor Trucks—Githens on the Business Outlook—Miller Makes Analysis of Trade—Government May Make Gas Masks —Producing Gasoline from Kerosene

Railroad Control to Develop Truck Use

That the Government operation of the railroads will further develop the use of trucks in freight, express, postal and passenger service, was the view expressed recently by Arthur Reeves, general manager of the National Automobile Chamber of Commerce. He said:

Taking over the operation of the railroads by the Government will bring further recognition of the passenger car and motor truck as transportation factors. While railroad officials might dislike to take such action, Director General McAdoo is certain to require that more passengers and more freight for short distances be carried by motor vehicles and thus relieve railroad congestion at terminal points. With many passenger trains taken off, people must make greater use of motor cars.

If the Government retains control of the railroads after the war, as is generally expected, it is almost certain to co-ordinate the transportation of freight, express and postal matter, all of which pass over the railroads. To give the maximum service to all communities in the country, the Post Office Department will establish motor truck rural mail and parcels post service out of all the larger cities of the country, and motor stage lines and freight service between points on the railroads and towns without rail connection will be developed as feeders to the railroads.

This means an enormous development in the use of motor vehicles and of course a tremendous increase in their manufacture. Under private operation the railroads never have looked with favor on the motor vehicle, considering it as a competition instead of utilizing it as a means of increasing their own business and revenue, as is done by the leading railroads in England.

H. A. Githens on the Business Outlook

That the automobile industry is not facing the critical situation which unauthoritative reports have seemed to indicate, is evidenced by the well-founded optimism and activity of the automobile accessory and equipment industry. In this connection, the views of H. A. Githens, general sales manager of the Federal Rubber Co. of Cudahy, Wis., as expressed in a recent luncheon address in Chicago, will be of interest.

"There is nothing in the cards at present," Mr. Githens said, "to indicate that it will be necessary for the suspension of such an important and necessary product as motor cars. On the other hand, the men who control the destinies of the nation are going to the extreme in contradicting the charge that there is any thought of seriously imperiling the third largest industry in the country.

"Such a spirit of co-operation as that now manifest between federal authority and the industries which go to make up the automobile trade, cannot help being conducive toward healthful trade conditions.

"In the Federal plant, we noted the change for the better in the sentiment of the automobile men almost as soon as the encouraging reports started coming out of Washington. Orders which had been held up for several weeks came through in quantities, some of them specifying larger deliveries of tires than we had dreamed of a few weeks ago.

"For this reason it can be stated emphatically that 1918 prospects are most encouraging for the Federal Rubber Co."

Monatiquot Has Attractive Calendar

The Monatiquot Rubber Works, South Braintree, Mass., has just sent out an attractive calendar in colors, having a picture of Squantum, Chief of the Monatiquots, on the face of it.

Producing Gasoline from Kerosene

At a recent meeting of the Electro-Chemical Society, held in Pittsburgh, a process evolved by L. B. Cherry, of producing gasoline synthetically from kerosene by electrical means at a cost of fourtenths of a cent a gallon for current, was described in a paper read at the meeting.

By the process kerosene, with a specific gravity of 42.5 deg. Baume, is converted into gasoline of 65 deg. Baume, by first vaporizing the kerosene, after which the vapor is passed through heated cylinders through which a high frequency electrical discharge is passing. The conversion chambers are heated by induction from an electric current. In early experiments with chambers of limited length it was found that 33 per cent of the total amount of kerosene was converted into gasoline, but an additional 83 per cent conversion was obtained when the residue was run through the chambers again. By increasing the length of the chambers the percentage of conversion was increased to 78 per cent, and when the treatment chambers were further increased to 34 ft. complete conversion was obtained in one treatment. Mr. Cherry stated that he was unable to operate the new and enlarged equipment up to the time of presenting his paper due to the non-arrival of certain essential electrical equipment. This system of cracking and fractionating kerosene operates at comparatively low temperatures and at atmosphere pressure.

Interesting Trade Research by Miller

What is undoubtedly one of the largest trade researches ever made by a private concern, has recently been completed by the Miller Rubber Co., of Akron, Ohio. A large book has been compiled in which the tire situation is carefully analyzed, and the numerous problems of the tire distributors and dealers have been carefully worked out and solved. The opinions, criticisms and suggestions of 25,349 dealers, distributors, motorists and others are presented graphically in charts. Price-cutting, overproduction, etc., have all been given careful consideration.

From these various merchandising ideas the Miller company has worked out a comprehensive sales-building program which should materially assist the dealer and distributor in his sales for 1918.

Government to Make Own Gas Masks

Specific authority for the medical department of the Army to manufacture as well as buy gas masks, and an appropriation of $5,000 to enable the medical department to take advantage of the unusual opportunity to secure exhibits for its museum are asked in a letter from Surgeon General Gorgas, transmitting supplemental estimates for his department, to Congress.

The reason for asking specific authority to manufacture gas masks is explained as follows:

"The appropriations for hospital and medical department contained in the deficiency acts of June 5 and Oct. 6, 1917, make provision as a charge thereunder for the purchase of gas masks. Gas masks are not an article of ordinary trade or commerce, and it has been found practically impossible to persuade makers of commercial goods to assume the risks of their manufacture at stipulated prices as usually agreed to in government contracts.

"The medical department has accordingly been obliged to purchase parts and materials for these masks from various quarters, to employ third parties to transform the materials when such transformation was required, and to employ fourth parties to assemble the parts and materials in completed appliances. This circuitous procedure is a source of delay which may have the gravest consequences. Much of the delay could be avoided by empowering the medical department itself to conduct through its own direct agencies the transforming and assembling processes indicated."

Tire for Fire-Fighting Apparatus

Since the adoption of the motor-driven fire apparatus as standard fire-fighting equipment, the selection of tires best adopted to the various types of cars has been an important consideration by the tire manufacturer and the city official. Safety, of course, is the prime requirement, and speed one of the prerequisites. These two considerations really determine the kind of tire that must equip each piece of apparatus. For years only solid tires were used, pneumatics being eschewed for their liability to puncture. But gradually pneumatics were fitted, and now many types of apparatus operate on them.

Generally speaking, all chiefs' cars wear pneumatic tires. Pneumatics are ideal on medium-weight machines, which must run over streets partly unpaved or of sand or clay. Where streets are paved or of hard surface, a cushion type of tire is needed on heavy trucks that must exceed 35 miles an hour. On the heavy pumping engines, water towers and aerial trucks, solid tires are generally used. Speeds of over 20 miles are seldom developed by this class of trucks. As no one type of shoe meets all human needs, so no one type of tire meets all fire apparatus needs. The cushion tire predominates in the fire truck world, for the general utilitarian qualities. It cannot puncture, yet it gives and is the most comfortable riding of the tires that the public knows as solid tires. Yet the pneumatic is gaining rapidly, as its hitherto unknown virtues are discovered, and its wider use is being furthered by the Goodyear Tire & Rubber Co., Akron, Ohio.

Exports of Crude Rubber from Brazil

According to Consul George H. Pickerell, reporting from Para, Brazil, the total exports of crude rubber from Para and Manaos during the month of November, 1917, amounted to 8,340,433 lbs., compared with 5,587,693 lbs. for the same period in 1916. Shipments to the United States aggregated 4,168,597 and to Europe 4,171,836 lbs., compared with 2,879,044 and 2,708,672 lbs. respectively in 1916.

Winnipeg Dealers to Close Sundays

At a recent meeting of the dealers' section of the Winnipeg Motor Trades' Association it was decided to close dealers' garages for the sale of gasoline, oil, supplies, service or repair work at 7 p.m. each week day and entirely on Sundays and holidays. The dealers are of the opinion that the sales end of the business is distinctly separate from garage work, and they wish to get away altogether from the garage business and to leave it to the gasoline filling stations and ordinary garages where no cars are sold to deal with the supply and repair end of the work.

News from the Rubber Metropolis

Akron Aids Recreational Facilities—Goodrich Stages Pageant—Goodyear Changes—Mason to Increase Production—Beck to Assist Government—Goodyear Friars Entertain Soldiers

Akron Aids Recreational Facilities

(Special Akron Correspondence.)

Akron is soon to stand with the foremost cities in the country in the matter of recreational facilities, Mayor Myers announced at the Goodyear athletes' smoker banquet given recently.

Following the announcement of the mayor, C. W. Seiberling, vice-president of the Goodyear Tire & Rubber Co. and president of the Chamber of Commerce, said that if the present city administration would foster such a movement the chamber would back it up. "As much as we want to help the amateurs here," Seiberling said, "we find that it all we can do to procure fields for our own employes. We give the amateur all the help we can after our own men are taken care of, but this is not as much as we would like to give." It is not improbable that Seiberling himself, an ardent follower of sports of all kinds, may be named to represent the business interests of the city.

Goodrich Stages Pageant

(Special Akron Correspondence.)

The auditorium of the B. F. Goodrich Co. was the melting pot of nations recently when 18 different nationalities took part in the pageant staged by Department 36.

Songs, dances and music made up the program. Among other features were folk dances by Roumanians in native costume and selections by the Slovak Lutheran church choir.

The closing number was a tableau showing Uncle Sam surrounded by the many nationalities under Old Glory. Twelve hundred persons attended the exercises.

Goodyear Branch Changes

Shifts in the management of branches of the Goodyear Tire & Rubber Co., Akron, Ohio, have put new names in four of them. P. A. Kerns, formerly manager at Buffalo, N. Y., being succeeded at Butte by W. P. Peete, who has been handling special Government work in Washington. F. L. Morgan has been raised from the post of assistant at Philadelphia, to manager in charge of the branch at Cleveland, Ohio. R. J. Davis, formerly city salesman at Jacksonville, Fla., has been made manager of the branch at Nashville, Tenn., succeeding E. H. Morris, who has entered Federal service.

Mason to Increase Tire Production

A large force of men is at present at work installing the new calenders and mills of The Mason Tire & Rubber Co., Kent, Ohio, which, when erected and in operation, will give the Mason plant a daily production of 1500 tires.

Other necessary machinery is arriving steadily and is being installed as fast as it reaches the factory. Freight embargoes and other causes of traffic delay have held back somewhat the receipt and erection of the new machinery.

To Make Three Grades of Bicycle Tires

For the 1918 season, the Firestone Tire & Rubber Co., Akron, Ohio, will make but three bicycle tires: a heavy service tire, a medium weight road tire, and a light road tire at popular prices.

PARTICIPANTS IN GOODRICH PAGEANT

Beck to Assist Government

(Special Akron Correspondence.)

Raymond Beck, director of the Akron Automobile Club and chairman of the roads and streets committee, has become chief engineer of the motor transport division of the Council of National Defense. As such he is one of the government's $1 a year men.

RAYMOND BECK

Beck has been chief of the touring bureau of the B. F. Goodrich Co. for years, and has taken great interest in the development of motor highways throughout the country. His department has erected thousands of sign posts to guide motorists, and in cooperation with automobile clubs all over the country, has given out millions of cards containing road information.

In this new work Beck will have charge of routing the tremendous truck transportation of the government all over the United States. He is said to be the best informed man on automobile roads in the United States and for that reason was selected by the government officials for this special line of work. His services are donated to the government by the B. F. Goodrich Co.

Goodyear Friars Entertain Soldiers

The men who have joined the training camps from Akron, Ohio, the nation's chief rubber city, are stationed principally at Camp Sherman in Ohio, and Camp Sheridan in Alabama. More than two thousand of these men have come from the factory and offices of the Goodyear Tire & Rubber Co. This company recognizing the great need of providing proper entertainment for the soldiers as a part of the program of maintaining their excellent morale, and to bring to its own men in the camps an evening's entertainment with a home tinge, has sent the Goodyear Friars to both these camps. The Friars are a troupe of amateur and ex-professional performers, all employees of the company, whose efforts are chiefly in the direction of minstrels. They have just returned from a 1700 mile trip to Camp Sheridan, the longest known journey that any troupe has made for the purpose of entertaining the soldiers at any of the training camps.

Important Trade Happenings

New Priority Certificates—Training Tire Vulcanizers for the Army—Broadwell Optimistic—Pearce Progress—Mason's New Office Building—Chicago Automobile Show—Thermoid Dinner

New Priority Certificates

In all future applications for priority in war orders, a new form of application issued by the priority board of the War Industries Board will be used. Since September 21 the priorities division has been issuing two kinds of certificates. In the future, only one kind of certificate will be issued, to be known as a "priority certificate." There will be no change whatever in the status of the principal and subsidiary certificates now outstanding, it is declared, but the new form will be used alike in the future for all who have been accustomed in the past to apply for principal certificates as well as those who have been applying for subsidiary certificates.

There is very little difference in the new form of application from the earlier forms. The new form of application differs from the previous forms chiefly in that it is much more complete and calls for all the facts which the division must have in order to consider all the facts intelligently; and in the second place, each application must be verified by an affidavit of the applicant, except the applications which are made by representatives of the American or allied industries. The division will continue in the future, as in the past, to issue certificates only on specified orders for materials, commodities, or work. No industrial plant, material or commodity will be given blanket certificates.

The new application contains ten questions which must be filled out in detail by the applicant. The name and address of the person who is to supply the material, or perform the work, must be given, as well as all other information pertaining to the material or work for which priority is desired.

Tire Dealers to Train Vulcanizers for Army

At its annual meeting the Minneapolis Tire Dealers Association endorsed plans for the training of vulcanizers free for the Government. The Association proposes to train twenty to twenty-five men at a time, or three classes of six weeks each until May 15, and after that date, classes of fifteen men each. A general course is to be decided upon. The men will be distributed among the various tire shops, each shop foreman to be responsible for the training to a general committee. The committee will make personal inspection of the men at work once a week and will also have a weekly joint session with oral or written examination, in cooperation with M. R. Bass of the Dunwoody Institute.

"Our association hopes that other trades will become interested in similar patriotic work," said secretary-treasurer H. F. Lundberg. At this meeting a constitution and by-laws were adopted, and officers elected as follows: President, Fred Weil; vice-president, W. D. Scott, secretary-treasurer, H. F. Lundberg.

Broadwell Optimistic

E. H. Broadwell, vice-president of the Fisk Rubber Co., is one of the large tire manufacturers who are sanguine that the curtailment of automobile production in this country will not be of a serious character. Commenting on the situation as it applies to the automobile and tire industries, Mr. Broadwell is quoted as saying:

"Curtailment in the production of cars must necessarily come, but to the thousands of dealers in the country that does not mean, by any means, the closing of their doors. Cars which would no doubt become obsolete will be overhauled and kept in condition. The owner of a car today who has been in the habit of buying a new one each year, if unable to get that new one this coming year, will have his car put in shape—possibly in much better shape than the one who will purchase it second-hand. In other words, by the very shortage of cars business will be created.

"The greatest problems which face our country today are those of transportation. It does not make any difference whether it is in the city or the country, transportation is a factor. The individual transportation by the automobile has been one of the greatest factors in the development of our country, and with the probable output this year of 1,800,000 cars, if the production was cut 50 per cent, would put between 800,000 and 1,000,000 new cars into operation. This, together with the estimate of 4,000,000 in operation today, would, with the possible necessary discarding of those old mode'ls which can no longer be made to run, mean that by next year we should see from 4,500,000 to 4,750,000 cars in use. All require service and if any individual today disposes of his machine through his inability to operate it the man who buys it buys it for the purpose of operation."

Progress at the Pearce Plant

H. H. Swan, who for the past six years has been superintendent of the tire department of the Portage Rubber Co., Barberton, Ohio, and formerly with the Kelly-Springfield Tire Co., has been elected a director of the Pearce Tire & Rubber Co., Ashtabula, Ohio, and will be general superintendent of the plant. Charles L. Foster, formerly of Akron, Ohio, and well known in electrical engineering circles, is vice-president and consulting engineer.

At the next annual meeting, to be held this month, the company's capitalization will be increased from $100,000 to $200,000. This will be underwritten by present stockholders.

The Pearce plant is now fully completed and is two stories high, 76 x 180 feet, and has a floor space of 24,000 square feet. The New York Central Railroad passes the door, and there is a frontage of 1250 feet on the tracks. The power house adjoins the main building and contains a stack that when completed will be 110 feet high. A warehouse, 40 x 75 feet, will be erected as soon as weather permits. Altogether the company holds 17¾ acres.

Mason Building Near Completion

The new office building of The Mason Tire & Rubber Co. is rapidly nearing completion and the factory offices will be installed in the new building in a very short time.

This building is erected at the entrance to the drive leading to the factory and is directly opposite the restaurant building, and will contain private offices for the executives, a general office and, in the basement, a printing plant to handle Mason printing.

The portion of the factory building now devoted to offices will be given over to the manufacture of tires.

Chicago Automobile Show

The spirit of optimism so noticeable at the New York automobile shows was reflected at the show in Chicago, which was held at the Coliseum from Jan. 26 to Feb. 2. There were fewer exhibits of cars and accessories this year than last, and from the point of view of novelties the Chicago show was not up to the standards set by preceding shows.

The showing of accessories and parts was more diversified than ever, and attracted large crowds of interested spectators. These exhibits appeared to even better advantage than at the New York show. The fence arrangement that is always used at Chicago, and which doesn't seem to have changed much for several years, sets off the goods well, and many attractive displays were in evidence.

The Chicago show started under a handicap, an unusually severe snowstorm having tied up the city. But despite a bad start, the attendance picked up daily and toward the end of the week there was no cause for complaint on this score. Those from the East who visited the show were struck by the atmosphere of "business as usual" manifest on every hand. This attitude has frequently been labeled "Western optimism," yet in reality it is nothing more nor less than believing what is rather than fearing what may be.

Thermoid Dinner

Trade acceptances divided honors and attention with Thermoid sales and advertising policies for 1918, at a dinner recently held in New York City by the metropolitan branch of the Thermoid Rubber Co., Trenton, N. J. The guests of honor who spoke on these respective subjects were J. T. Monhan, vice-president of the National Bank of Cuba; H. F. Blanchard, Thermoid sales manager, and S. H. Ritchie of the J. Walter Thompson Co.

Fisk Sales Gain 40 Per Cent.

The Fisk Rubber Co., Boston, Mass., in its fiscal year to Dec. 31, made a gain in gross sales over 1916 of over 40 per cent. The gross turnover during the late twelve months was more than $28,000,000. This means that the company's business jumped from $10,857,324 to between $28,000,000 and $29,000,000.

The Fisk Rubber Co. has outstanding $9,050,000 of first preferred stock and $4,500,000 of second preferred. On these issues 7 per cent. dividends amount to $950,000.

No War Skimping at Mohawk Plant

M. E. Mason, sales manager of the Mohawk Rubber Co., Akron, Ohio, in a recent statement said that despite the war and the fact that it has greatly increased the cost of tire manufacturing, the present quality of Mohawk tire would be maintained. In regard to the demand for a cheap tire, Mr. Mason stated that there is no evidence of an increasing demand for tires of the poorer quality, but on the contrary, the demand for a good tire is constantly increasing.

Brictson Manufacturing Co. Moves Plant to Omaha

The Brictson Manufacturing Co., which for some time has been located at Brookings, S. D., is planning the erection of a plant at Omaha, Neb., where it will manufacture a standard line of tires and tubes, in addition to operating a reclaiming plant. C. A. Brictson, president of the company, selected Omaha because of its central location and excellent railway facilities.

Market for Manufactured Rubber Goods

NEW YORK, February 8, 1918.

It is difficult at this time to properly describe the condition of the market for rubber manufacturers. Retail trade is being done under most abnormal conditions and dealers who are naturally pessimistic find many reasons to justify them in making loud complaints. Optimists, however, believe that we have reached the height of our real troubles and can look forward to better conditions with the passing of the severe weather. That the optimists are in the majority is shown by the flow of orders reported by jobbers and manufacturers. The business being done now would have been considered unusual in normal times, but the trade has been accustomed to huge orders and the first sign of a drop in business caused real concern to the more short-sighted elements.

The fuel situation is most acute, many cities have only a few days' supply on hand, but the milder temperatures we are now enjoying are likely to facilitate arrivals of coal and remove the danger of a general closing of factories that has been feared. The Monday closing order is being obeyed by the rubber industry with considerable discomfort and loss.

MECHANICAL GOODS

Manufacturers and jobbers report a very satisfactory volume of business in mechanical rubber goods, their chief difficulty being to keep up stocks. The factories are running as full as they can under prevailing conditions, but are having much difficulty with shipments. In many instances, it is said, the accumulation of manufactured goods in the factory storerooms has become so great that production has had to be curtailed, and in some cases stopped altogether.

TIRES

The cold weather has lasted longer and has been more severe than usual and has naturally reduced retail sales of pneumatic tires. Well-informed men have great confidence in the future of this year's tire business, but there is, nevertheless, a strong manifestation of conservatism among jobbers and retail dealers, with the result that deliveries are below the normal for this season. Many manufacturers have unusually large stocks of tires on their hands, and have been obliged to curtail production. Some are reported as having shut down their plants for the reason that their warehouse facilities have reached their limit and they cannot store any more goods, the only thing to do being to close until the congestion of freight is removed.

DRUGGISTS' SUNDRIES

There appears to be a strong tendency to conservatism among jobbers, with a disposition to order only fill-in merchandise for a month or two ahead. A considerable business is being done on articles for war purposes.

There is little stocking-up among retailers, barring such lines as they fear that otherwise will be difficult to get in time for seasonable demands. Collections continue fairly good, while freight deliveries are slower than ever before.

FOOTWEAR

Rubber footwear manufacturers and their agents report that they have booked practically all the orders they can accept for the coming season. Many jobbers have been without "rubbers" since September, and are only now beginning to be able to fill some of the vacant space in their store rooms. Transit now often consumes months where in pre-war times it was a matter of days. Work is well advanced on all Government orders and civilian business is receiving attention, but it is probable that many dealers will be disappointed this year when they get their allotment of rubber footwear.

The Fabric Market

NEW YORK, February 8, 1918.

There have been only minor fluctuations in the raw cotton market since our last report. The coal situation continues unsatisfactory, with every indication that cotton consumption figures for this country for both January and February will be exceedingly disappointing. The increasing concentration on the shipping of troops, war supplies and food for our Allies will undoubtedly curtail cotton exports still further than they have been heretofore curtailed. These factors are likely to lead to other declines in cotton values such as the one experienced on February 6. There may be intense shortage of cotton in Europe, but that will be of little importance on this side of the Atlantic if ships are not available.

As spring approaches the acreage question will be nearing a solution, but so far indications are too conflicting to warrant any decided views. On the one hand, the price is an incentive to plant every acre available, and there is plenty of money in the South for ample financial arrangements. Cotton has always been the cash crop of the South and the easiest on which to obtain assistance from the banks. On the other hand, the high prices of all necessities will turn considerable land to corn, wheat and minor foodstuffs. Labor is very scarce and winter weather has so far been unfavorable in most sections, especially in Texas where unprecedented drought is still unbroken. Floods will also be a menace that may interfere seriously in the Mississippi Valley should the melting of northern snow and ice be delayed until the spring rains set in.

EGYPTIAN MARKET

There is nothing new in the Egyptian cotton situation in America. Importations continue to be small and far between. The latest reports indicate that the next cargo, which is only the second this year, will not reach this country until the middle of March, or possibly early in April. Information from Egypt shows that prices f. o. b. Alexandria are lower: Sakellarides now being down to 42 to 45 cents and Uppers 39 to 41 cents, but this is no consolation to users of these staples in America so long as importations are cut off.

SEA ISLAND

Meanwhile Sea Island cotton remains firm and unchanged at 75 to 75½ cents for average extra choice. Inquiries contine to be fair, but owners are not disposed to make concessions.

YARNS

Spot yarn is high, quotations indicating bareness of stocks of desirable standard cotton numbers. Yarn men say that shipments from the South are still uncertain, though the railroads seem to have cleaned up many that were in transit for delayed periods. Permits have to be obtained by Southern mills for all rail shipments on Government yarn, but for the civilian trade shipments may be made by rail and water to certain Northern ports, the congestion being less severe below Newport News. Considerable shipments of yarn are said to have been made by express, but the cost is high, and limitations are placed even on these with respect to quantities. Motor trucks are being used to haul yarns between Philadelphia and New York.

FABRICS

Many lines of fabrics have been withdrawn from the primary market, the mill agents wishing to give the mills an opportunity to catch up with delayed deliveries and adjust their plans to cope with more days of non-production that are expected.

The sinking of the "Tuscania" had a sobering effect over mercantile circles and the next Liberty Loan is expected to lead to further tightening of the strings that hold the money needed for business transactions.

According to mill agents, there are many indications of further tightening in the production of non-essentials in war time manufacturing and merchandising.

TIRE FABRICS

The tire fabric market continues generally quiet. Tire manufacturers are displaying much conservatism in buying for next year's requirements. The mill men persist in their belief that a shortage of tire fabrics will be experienced, due chiefly to the large number of looms that have been taken over for heavy ducks for Government use.

HOSE AND BELTING FABRICS

There has been no change in the mechanical ducks market since our last report. The closing of the mills at the order of the Fuel Administration, and the serious prospect of another shut-down because of the fuel shortage, have upset the calculations of the mill men. This fact is reflected in the hesitancy the duck mills are showing in buying cotton and yarn. The market is very firm and prices show upward tendencies.

DRILLS, OSNABURGS AND SHEETINGS

Some widths of these fabrics have been withdrawn from sale to give manufacturers an opportunity to catch up on delayed deliveries. The demand is very active. The quiet that has prevailed in some lines of cotton goods used by the Government is also said to be passing, and further orders are predicted before the end of the month. The mills do not find that Government orders help them to any appreciable extent in the matter of fuel for operation on Mondays, but many mill men say no time is lost by the Government in making protests when there are delays in completing goods wanted by the various departments of the Government.

GARMENT CLOTHS

There are rumors that the Government will soon place further business on uniform cloths, following the readjustment of buying organizations in the War Department. The mill are well sold up, and in many instances are reported as turning down orders for delivery before May.

BURLAPS

The burlap market is quiet and spotty. Traders are still seeking in vain for the development of a well-defined trend. The selling end of the market has plenty of confidence, but there is little enthusiasm on the part of buyers. Prices are nominal and quotations vary; some holders are loath to quote at all.

NEW YORK QUOTATIONS

TIRE FABRICS.

17¼-ounce Sea Island, combed, sq. yd.	$1.62@1.73
17¼-ounce Egyptian, combed	1.24@1.60
17¼-ounce Egyptian, carded	1.20@1.25
17¼-ounce Peelers, carded	1.00@1.25
17¼-ounce Peelers, combed	1.05@1.10

MECHANICAL DUCKS

Hose (nominal)	.65@ .70
Belting (nominal)	.65@ .70

DUCKS

Single Filling (pound basis) lb.	.64
Double Filling (pound basis)	.75

DRILLS

37-inch 2.35-yard yd.	.26
27-inch 2.75-yard	.21¼
37-inch 3.00-yard	.20
37-inch 3.25-yard	.19
37-inch 3.50-yard	.19
37-inch 3.95-yard	.18
38-inch 2-yard Southern lb.	.52
38-inch 2.00-yard Northern	.55
40-inch 2.47-yard Northern yd.	.26
40-inch 2.47-yard Northern	.33
52-inch 1.90-yard Southern	.35
52-inch 1.90-yard Northern	.32
52-inch 1.95-yard Southern	.36
52-inch 1.95-yard Northern	.35
60-inch 1.52-yard Southern	.40
60-inch 1.52-yard Northern	.40

SHEETINGS

40-inch 2.35-yard yd.	.25
40-inch 2.50-yard	.23
40-inch 2.85-yard	.22
40-inch 3.00-yard	.21
40-inch 3.25-yard	.22
40-inch 3.60-yard	.18½
40-inch 3.75-yard	.17
40-inch 4.25-yard	.15
38-inch Jacket Cloths yd.	.20@.22

TWILLS FOR PROOFING

37-inch 2.85-yard yd.	.23
37-inch 3.25-yard	.28
37-inch 2.10-yard	.28½

COTTON STOCKINETTES

(52-inch)

E—11½-ounce yd.	.60@ .65
A—11 -ounce	.70@ .80

BURLAPS

(Spot Carload Lots)

40-inch 8 -ounce	17.25
40-inch 10 -ounce	21.25
40-inch 10½-ounce	21.50

Chemicals and Compounding Materials

NEW YORK, Feb. 8, 1918.

Consumption of chemicals and compounding materials in the rubber industry is holding up well, considering the present unsettled state of business. With but comparatively few exceptions, prices are being firmly maintained, and some prominent factors report that they have already disposed of much of their 1918 output. The high cost of basic materials, as well as the transportation difficulties, tend to stiffen up prices. Supplies of crude sulphur at the mines are ample, yet the movement of this material is greatly retarded for lack of shipping facilities, with the result that spot offerings of the refined grades are moderate. Antimony sulphurets are holding steady, with special brands commanding a premium. Caustic soda developed further weakness on freer offerings. In the division for colors interest centered in blacks and vermilion, stocks of the latter being scanty. The lead and zinc pigments ruled firm, in sympathy with the metals.

ANTIMONY SULPHURETS

The slightly easier position of antimony had no influence upon the market for sulphurets. Prices for the red, golden and crimson cover a rather wide range, reflecting the views of different importers and producers. The red sulphuret of antimony is held at 25 to 27c. per pound, as to quantity.

ANILINE OIL

Sales of pure aniline oil at 26 and 27c. per pound, drums extra, are reported, which would indicate that the market is on a steady basis. Producers as a rule take a firm view of the situation.

BENZOL

Old contracts are being renewed at a fair rate and prices, while unsettled in some quarters, closed unchanged at 35 to 40c. per gallon, the inside figure obtaining for round lots, in bulk, f.o.b. works.

CAUSTIC SODA

The market for caustic soda is unsettled due to the presence of re-sale parcels. Demand has been moderate and scattered lots of the 76 per cent solid sold at 6c. per pound. The price range at the close is 6 to 6¼c. per pound.

COLORS

Spot prices for dry colors are holding firm, due chiefly to the delay in moving supplies from producing centers. Offerings of English vermilion are scanty and prices of $2 to $2.10 per pound are merely nominal. Blacks are in a strong position. Ultramarine blues are held at 20 to 40c. per pound, as to quality.

LEAD PIGMENTS

Fluctuations in the market for pig lead had little if any influence upon sellers of the pigments. Corroders take a firm view of the situation and continue to quote on the basis of 8½c. per pound for the sublimed. Producers of lithopone report that they are well sold up, covering January-March shipments, but quote the market unchanged at 6½ to 7c. per pound.

SULPHUR

Consumption of sulphur is heavy, due to the war, yet there is no shortage in the available supply of the crude material. The shortage previously referred to is due to the lack of shipping facilities at the mines, and this tends to create a tight market here. Refined sulphur is holding at $3.85 per 100 pounds for the flour, in barrels, car-lots.

ZINC OXIDE

Rubber makers are commencing to speculate as to the probable basis for the April-June schedule of prices. Producers look for no important changes, it being pointed out that the market for basic materials has varied but little since the first of the year, and the output of the finished product is not sufficient to meet the demands of all industries. Under the existing regulations rubber manufacturers receive priority in obtaining supplies. American process zinc oxide is held at 10¼ to 10½c. on contract. Second-hands offer spot material around 12¾ to 13½c. per pound.

Prices Current for Chemicals, Fillers, Colors, etc.

Acetone lb.	.39	@	.40
Accellerator, in drums lb.	.80	@	1.00
Acids, Acetic, 56% lb.	.11	@	.12
Carbolic, C. P. lb.	.54	@	.56
Cresylic, 95% gal.	1.10	@	1.15
Muriatic, 20 deg. lb.	.02¼	@	.02½
Muriatic, 22 deg. lb.	.02¾	@	.03¼
Nitric, 40 deg. lb.	.08½	@	.08¾
Nitric 42 deg. lb.	.09¼	@	.09½
Sulphuric, 60 deg. lb.	.01¾	@	.02
Tartaric, crystals lb.	.78½	@	—
Aluminum Flake ton	28.00	@	30.00
Aniline oil, bulk basis lb.	.26	@	.27
Antimony, metal spot lb.	13.87½	@	14.12½
Oxide lb.	15.00	@	16.00
Sulphuret, red lb.	.25	@	.26
Sulphuret, golden lb.	.26	@	.28
Sulphuret, crimson lb.	.45	@	.50
Asbestos ton	35.00	@	45.00
Asphaltum, Egyptian lb.	.22	@	.28
Domestic ton	20.00	@	26.00
Barium sulphate, technical lb.	.04¼	@	.04¾
Sulphide lb.	.06¾	@	.07¼
Barytes, prime white imported ton	*38.00	@	42.00
white, domestic ton	30.00	@	33.00
off color, domestic ton	19.00	@	21.00
Benzol, pure, bulk gal.	.35	@	.40
Beta-naphthal, sublimed lb.	.85	@	.90
unsublimed lb	.65	@	.70
Blacks, Drop lb.	.08	@	.15
Ivory lb.	.16	@	.30
Carbon gas, cases lb.	.24	@	.28
Lampblack R. M. lb.	.05	@	.07
Mineral blacks ton	28.00	@	32.00
Blues, Prussian lb.	.65	@	1.35
Soluble (potash) lb.	1.35	@	1.60
Ultramarine lb.	.20	@	.38
Browns, Umber, Turkey, burnt, powdered lb.	.04	@	.05
American, burnt lb.	.03½	@	.03¾
Cadmium sulphide, yellow lb.	2.00	@	2.25
Carbon, bisulphide, bulk lb.	.07	@	.07½
tetrachloride, drums lb.	.15½	@	.16
Caustic Soda, 76@78% lb.	.06	@	.06¼
Chalk, precipitated, extra light lb.	.05	@	.05¾
light lb.	.04¾	@	.05¼
heavy lb.	.03¾	@	.04¼
China clay, domestic ton	18.00	@	22.00
imported ton	35.00	@	40.00
Fossil flour lb.	.03¾	@	.05
Gilsonite ton	40.00	@	44.00
Glue, extra white lb.	*.35	@	.45
medium lb.	*.30	@	.35
low grade lb.	*.25	@	.30
Glycerine, C. P. (drums) lb.	.67½	@	—
Graphite, flake (bbl.) lb.	.18	@	.20
powdered (bbl.) lb.	.13	@	.15
Green, chrome, R. M. lb.	.12	@	.16
Ground glass (fine) lb.	.03	@	—
Hexamethylene lb.	1.00	@	1.05
Infusorial earth, powd'd. ton	60.00	@	—
bolted ton	70.00	@	—
Iron oxide, red, reduced grades lb.	.05	@	.06
red, pure, bright lb.	.11	@	.13
Lead, red oxide of lb.	.10	@	.10½
sublimed blue lb.	.08½	@	.09
white, basic carb. lb.	.09	@	.09½
white basic sulph. lb.	.08½	@	.09
Lime flour lb.	.01½	@	.01¾
Litharge lb.	.09½	@	.10
English lb.	*.12	@	.13
sublimed lb.	.09¼	@	.09¾
Lithopone, domestic lb.	.06½	@	.07
Magnesia, carbonate lb.	.11½	@	.13
calcined, heavy lb.	.11½	@	—
calcined, light lb.	.70	@	—
Magnesite, calcined, pwd. ton	65.00	@	70.00
Mica, powdered lb.	.03¾	@	.05
Mineral rubber (asphaltum base) ton	50.00	@	65.00
Naphtha, motor gasoline, (steel bbls.) gal.	.24	@	—
68 @ 70 degrees (steel bbls.) gal.	.30	@	—
70 @ 72 degrees (steel bbls.) gal.	.31	@	—
73 @ 76 degrees (steel bbls.) gal.	.33	@	—
machine (wood bbls.) gal	.41	@	—
Oil corn, crude cwt.	18.75	@	19.00
corn, refined cwt.	22.35	@	22.65
linseed (bbl.) gal.	1.27	@	1.29
palm, Lagos lb.	*.32	@	.33
pine, yellow gal.	.45	@	.46
rapeseed, refined gal.	1.65	@	1.70
rapeseed, blown gal.	1.72	@	1.78
rosin, first rectified gal.	.42	@	.43
tar (commercial) gal.	.30	@	.32
Orange mineral, American lb.	.13	@	.13½
imported lb.	*.15	@	.20
Paraphenylenediamine lb.	2.75	@	3.25
Petrolatum, bbls., amber lb.	.05	@	.05¼
pale yellow lb.	.05¼	@	.05½
Pine tar, kiln bbl.	13.50	@	14.00
Pitch bbl.	4.50	@	4.75
Plaster of paris bbl.	2.00	@	2.50
Red, Tuscan lb.	.24	@	.30
Indian (reduced) lb.	.06	@	.07
Standard lb.	.08	@	.11
Rosin (common to good), @ 280 lbs. bbl.	6.75	@	7.00
Rotten stone, powdered lb.	.03	@	.04½
Rubber, substitute, black lb.	.12	@	.16
white lb.	.14	@	.22
brown lb.	.18	@	.24
Shellac, fine orange lb.	.66	@	—
T. N. lb.	.59	@	—
Bleached, ordinary lb.	.56	@	—
Bleached, bone dry lb.	.66	@	.67
Silex (silica) ton	24.00	@	34.00
Soapstone, powdered ton	12.00	@	20.00
Starch, corn, powdered lb.	5.00	@	5.10
Sulphur, crude ton	*50.00	@	..
refined, flour, per 100-pounds, in bbls.	3.85	@	4.40
roll	3.70	@	4.15
commercial	3.35	@	3.65
Talc, American ton	15.00	@	18.00
French ton	22.00	@	30.00
Toluol, pure, in drums gal.	*5.00	@	5.50
Tripolite earth ton	60.00	@	65.00
Turpentine, pure gum—spirits gal.	.47	@	.47½
wood gal.	.44	@	.45
Venice, artificial gal.	.12	@	.13
Vermilion, English lb.	*2.00	@	2.10
Wax, beeswax, crude yel. lb.	.35	@	.37
ceresin, white lb.	.18	@	.19
carnauba, No. 3 lb.	*.54	@	.55
Montan lb.	*.35	@	.40
ozokerite, black lb.	.75	@	.80
ozokerite, green lb.	*.85	@	.95
Paraffin, refined, 118/120			

M. P. (bbls.) ..... lb.	.11½	@	.11¾
Wax, paraffin, 123/125 M.P. lb.	.13	@	.13¼
128/130 M.P. ..... lb.	.13¼	@	.13½
133/136 M.P. ..... lb.	•.14½	@	.14¾
Crude, 120/122 M.P. ... lb.	.09	@	.09¼
124/126 M.P. ..... lb.	.09½	@	.09¾
Whiting, commercial ... cwt.	.95	@	1.10
Alba ..... cwt.	1.00	@	—
Paris, white, American ..... cwt.	1.25	@	—
English cliffstone. cwt.	1.50	@	—
Yellow chrome ..... lb.	.23	@	.25

Zinc oxide, American process, horsehead brand.. lb.	†.10¼	@	.10½
selected ..... lb.	†.10⅜	@	.11
"XX red" ..... lb.	†.10¼	@	.10½
French process, green seal ..... lb.	†.13½	@	.13¾
red seal ..... lb.	†.13	@	.13¼
white seal ..... lb.	†.14	@	.14¼
Zinc substitutes ..... ton	30.00	@	35.00
Zinc, sulphide, pure..... lb.	•.07½	@	.08

†Contract prices. •Nominal.

The Crude Rubber Market

NEW YORK, Feb. 8, 1918.

The position of the crude rubber market has not shown any great change during the last fortnight. After a period of weakness in the plantation grades, due to freer offerings of futures, some buying by dealers was noted, which brought out a firmer feeling covering the spot position. Contracted with the prices which obtained two weeks ago, the plantation grades closed practically unchanged, while the Brazilian descriptions advanced from 1 to 3c. per pound. The buying on the part of manufacturers was light. This inactivity was attributed partly to the Fuel Administration's closing order, which hit the Akron plants. Only a few factories operating on gas masks for the army received exemption. Under these conditions manufacturers were not disposed to load up with crude rubber.

Talk of tonnage restrictions from the East, as well as the proposed plan limiting imports of non-essentials, had little influence upon the trade. Operators point to the world's production of rubber for 1917 to substantiate their rather bearish views for 1918. According to some importers the output of rubber is sufficiently large, taking the present basis of consumption into consideration, to warrant a fairly low level of prices. Owing to the war conditions the consumption of crude rubber has not made the progress expected.

Ceylon rubber for shipment over the last half of the year is available at the lowest prices on record. First latex pale crepe for July-December shipment is offering on the basis of 51c. per pound, without attracting much business. The spot price is holding around 54½c. per pound, due to the delay in receiving shipments from the coast as a result of the rail congestion. Ribbed smoked sheets for July-December shipment closed at 50c., with amber crepe at 46c. and No. 1 brown crepe at 45c. per pound. Ribbed smoked sheets on spot held at 54c. per pound.

Para up-river fine has advanced to the extent of 2c. per pound, closing at 58c. per pound. There has been a fair demand for up-river fine. For certain work, such as making gas masks for the Government, it is necessary for manufacturers to use up-river fine exclusively in order to meet the specifications. This special work has brought out a better call for the higher grades of Brazilian rubber. Up-river medium closed firm at 53c. per pound, with coarse at 37½c. and Caucho ball at 37c. Brazilian rubber for future delivery is virtually on a parity with the spot market.

The firmer position of Brazilian rubber was reflected in a steady market for Central American brands. Prime Corinto advanced slightly, closing at 36½ to 37c. per pound, with Esmeralda at 36 to 36½c. per pound. African grades are in limited supply and prices named are wholly nominal. Guayule rubber is moving slowly on the former basis of 26c. per pound. The low position of plantations tends to depress values for Guayule. East Indian gums are holding steady.

In London the market has been uninteresting. Trading there is reported as quiet, and with Russia no longer a buyer, and consumption as a whole curtailed, little support has been in evidence. First latex pale crepe closed nominally at 27½c. per pound, prompt shipment, with smoked sheets at 27¼c. per pound.

	Spot.	Mar.-June.	July-Sept.
Para—Up-river fine..... lb.	58	57½	..
Up-river medium	53	53	..
Up-river coarse	37½	37	..
Caucho ball	37	37	..
Islands fine	48	..	..
Islands coarse	25	..	..
Cameta	25	..	..
Madeira fine	59½	..	..
Ceylons-Smoked sheets, ribbed.	54	51	50
Smokers sheets, plain.....	52	50	49
First latex pale crepe.....	54½	51½	51
Amber crepe	47	46	46
Clean brown crepe.....	46	45	45
Centrals—Corinto, prime.....	36½	..	..
Esmeralda, prime	36	..	..
Mexican scrap	35	..	..
Balata sheets	•82	..	..
Balata, block Panama.....	53	..	..
Guayule	26	..	..
Africans—Rio Nunez, string..	•62	..	..
Massai, red	•48	..	..
East Indian Pontianak.....	12	12	..
Palembang	12¼	12¼	..

• Nominal.

Scrap Rubber

NEW YORK, Feb. 8, 1918.

Very quiet conditions continue to prevail in the scrap rubber market, and there is no feature worthy of special mention. The undertone is firm and prices are nominal.

The following prices are paid for scrap rubber delivered at the reclaiming mill:

Boots and shoes.....	9	@	9½
Arctics, trimmed	..	@	7
Arctics, untrimmed	..	@	6
Tires—Automobile	..	@	5½
Bicycles, pneumatic	5	@	..
Hose, mixed	2	@	2¼
Air brake	..	@	5
Inner tubes, No. 1.....	20	@	21
Inner tubes, No. 2.....	..	@	10½
Red	..	@	10½

Gillette to Add to Plant

The Gillette Tire Co., Eau Claire, Wis., is planning the construction of two additional stories to its present one-story building. To provide immediate warehousing and shipping facilities, the company has planned a three-story concrete and brick building, 66 x 100 ft., adjoining the main factory.

Lynn Moves to Warren, R. I.

On account of a rapidly expanding business, the Lynn Rubber Manufacturing Co., Lynn, Mass., is erecting a factory at Warren, R. I., a short distance from Providence, where labor conditions are more favorable than at Lynn, and where there are many other natural advantages. On Jan. 1, the company moved its arch support department and offices to its new location at Warren, and as soon as the building is completed the entire factory will be moved.

Ajax Free Dealers Service

The Ajax Rubber Co., Inc., Broadway and Fifty-eighth street, New York City, has installed in its advertising department a Dealers Free Service Bureau, by means of which the company's dealers can obtain advertising copy even though the contemplated advertising does not contain any mention of Ajax tires. If a dealer wants copy for his local paper, or for magazine advertising, or intends getting up a circular, and communicates with the Ajax bureau, stating the amount of space he intends using and other necessary facts, the company will get up copy and suggest the layout. In other words, if any agency for any particular make of automobile or automobile accessory is desirous of advertising its line it may call upon the dealers bureau for the same service as would be rendered by its own advertising agency.

The company is advising dealers that any advertising or sales problem properly submitted, in writing, will receive prompt attention and individual care. Letters that the dealers want sent to their trade for any special occasion are made up for them, or their own letters are corrected, and suggestions made so that the meaning of same will produce the maximum amount of results for the dealer. Dealers have requested that claim letters be sent to them, when they want to collect long past due, outstanding accounts, and at the same time are desirous of retaining the customers. Many other similar matters are submitted by the dealers to the Free Service Bureau.

Besides this, the bureau issues the usual booklets, electrotypes, slides, window displays, signs, pennants, banners, envelope inserts, etc.

Akron Auto and Accessory Men Loyal

According to an announcement by the Akron Automobile Trade Association, the city's tire and accessory stores will continue to be closed on fuelless Mondays as well as automobile garages and repair shops. However, services for the accommodation of automobiles exempted under the orders of the United States Fuel Administration will be provided by the dealers, according to Secretary Grover Reese.

"The attitude of the entire automobile, accessory, tire, battery and allied trades is one of loyalty to the national government in this crisis," said Mr Reese.

"To a man, every dealer wants to back the Fuel Administration and to obey the spirit of Dr. Garfield's order, but we realize that since a great number of businesses are excepted under the orders of the fuel administration, we must exercise care in the interpretation of the fuel order.

"Automobile owners should realize conditions and not expect garages and allied business to remain open to give services which are not essential to the winning of the war and which might be contrary to the aim and object of the Fuel Administration's orders. It is the duty of every red-blooded American citizen to take the right view of this situation."

Annual Hawkeye Meeting

At the annual meeting of the Hawkeye Tire & Rubber Co., Des Moines, Iowa, the 8 per cent annual dividend on the preferred stock was ordered paid, and a 6 per cent dividend was declared on the outstanding common stock, as of Feb. 1, 1918. The company has added additional machinery and equipment, and expects to increase its output to at least 500 tires and 400 tubes per day during the coming season.

American Rubber Patents

ISSUED JANUARY 15, 1918

1,253,259—To Isaac Leo, Chicago, Ill. Cooling Device for Automobile Tires.

1,253,271—To David H. Moore, Oklahoma, Okla. Vehicle Tire.

1,253,325—To Silas Winscott, Sturgeon, Mo. Vehicle Wheel Rim.

1,253,339—To Albert B. Beitman, East Cleveland, Ohio. Combined Tire-Carrier and Luggage Receptacle.

1,253,370—To Wladyslaw Gieracki, Avon, Conn. Life-Saving Suit.

1,253,381—To Otis A. Hollis, Pittsburgh, Pa., assignor to Hollis Automobile Traction Jack Co., Pittsburgh, Pa. Vehicle Wheel Tire.

Co., Ltd., Birmingham, England. Tire for Vehicle and Similar Wheels.

1,254,089—To Daniel R. Thomas, Oklahoma, Okla. Tire Shoe.

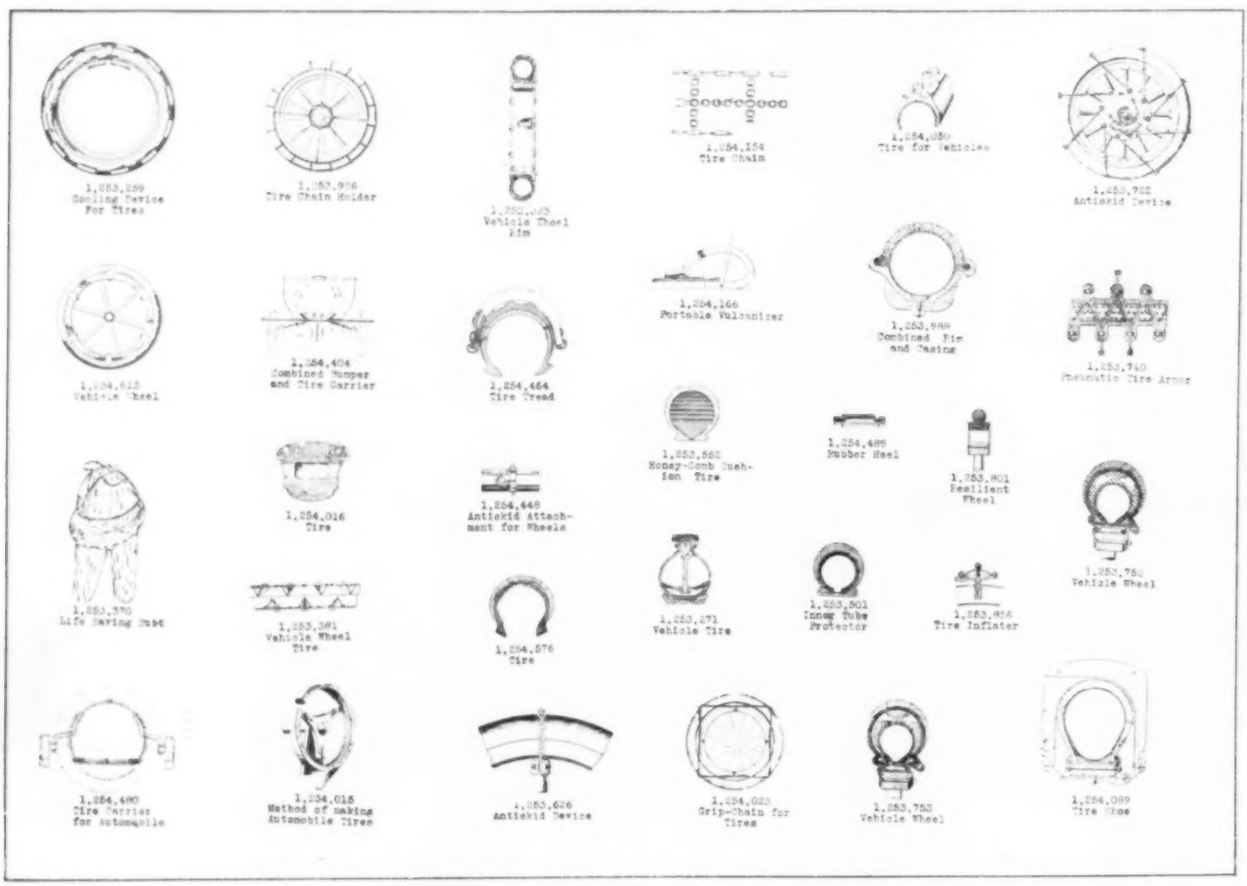
1,254,154—To Ray C. Noll, Pleasant Gap, Pa. Tire Chain.

1,254,166—Ora Staley, Indianapolis, Ind. Portable Vulcanizer.

1,254,404—To Russell H. Hartzler, Topeka, Kans. Combined Bumper and Tire Carrier.

1,254,448—To William A. Tarr, Bethany, W. Va., assignor of one-half to A. Campbell Jobes, Wheeling, W. Va. Antiskid Attachment for Wheels.

1,254,464—To Henry M. Benson, Los Angeles, Cal., assignor of one-half to Laura G. Fixen, Los Angeles, Cal. Tire Tread.



1,254,480—Andrew Christianson, Butler, Pa. Tire Carrier for Automobiles.

1,254,489—To Gilbert S. Ellithorpe, Chicago, Ill. Rubber Heel.

1,254,576—To Leon Jay Campbell, Chicago, Ill. Tire.

1,254,613—To Arthur V. Lyall, New York, N. Y. Vehicle Wheel.

1,254,632—To Edgar W. Snyder, Los Angeles, Cal., assignor by mesne assignments to Ocotillo Products Co., a Corporation of Delaware. Rubber Composition.

1,253,501—To Raymond N. Lago and William J. Barrett, San Francisco, Cal. Inner Tube Protector.

1,253,552—To Silas Winscott, Sturgeon, Mo. Honeycomb Cushion-Tire.

1,253,626—To William C. Mundorf, York, Pa. Antiskid Device for Vehicle Wheels.

1,253,722—To Martin W. Priel, Spokane, Wash. Antiskid Device.

1,253,740—To Simpson Granville Smith, Plainfield, N. J. Pneumatic Tire Armor.

1,253,752—To Charles C. Wais, Cincinnati, Ohio. Vehicle Wheel.

1,253,753—To Charles C. Wais, Cincinnati, Ohio. Vehicle Wheel.

1,253,801—To Charles A. Erwin, Moberly, Mo. Resilient Wheel.

1,253,856—To Melvon A. Marquette, San Francisco, Cal. Tire Inflater.

1,253,920—To Joseph R. Bowles, Lynchburg, Va. Tire Chain Holder.

1,253,988—To Harry Richard Lorenz and Henry William Ojendyk, Ashton, Neb. Combined Rim and Casing.

51,697—To Albert F. Selberling, Jonesboro, Ind., assignor to Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. Vehicle Tire.

ISSUED JANUARY 22, 1918

1,254,015—To James C. Anderson, Washington, D. C. Method of Making Automobile Tires.

1,254,016—To James C. Anderson, Washington, D. C. Tire.

1,254,023—To William J. Boyer, Chicago, Ill. Grip Chain for Tires.

1,254,054—To Colin Macbeth, Birmingham, England, assignor to The Dunlop Rubber

Recent Incorporations

The Ohio Rubber Co., Cleveland, Ohio., has increased its capital stock from $400,000 to $500,000.

The Denas Armor-Cased Tire Saving Co., Pittsburgh, Pa., has increased its capital from $200,000 to $1,000,000.

Kansas City Tire & Rubber Co., New York; preferred stock from 5000 to 8000 shares; common stock of no par value from 15,000 to 18,000.

Manufacturers Products Co., New York; capital, $100,000; to manufacture rubber and leather products and chemicals; incorporators: H. Burlingham, H. C. Neuberger, C. M. Chapman, 2 Rector Street, New York.

The B. B. Harris Tire & Rubber Co., Columbus, Ohio; capital, $10,000; incorporators: A. S. Hetzell, Charles A. Palmer, Karl E. Burr, Sherman B. Randall and B. B. Harris.

Memphis Tire & Vulcanizing Co., Shelby Co., Tenn.; capital, $10,000; incorporators: Y. E. Pridy, A. T. Davis, L. J. Davis, M. H. Ditching, H. E. Whitehead.

Union Tire & Rubber Co., Tulsa, Okla.; capital, $10,000; incorporators: C. A. Johnson, W. M. Smart, O. T. Owen.

Universal Tire Storage Co., Atchison, Kans.; capital, $15,000.

Anderson Tire Corp., New York; capital, $50,000; incorporators: M. L. Ottel, H. G. Hamilton, L. Breuger.

With the Dealers

Dreblow & Son, of Faribault, Minn., have leased the Martin Blackin Building on East Clark St., and are fixing it up for a tire vulcanizing shop. It is said that the new company has a process for retreading old tires. They will also do tire repairing. Chris. Jensen will be manager.

Louis B. Osbon has bought the interest of his partner, H. Heath, in the Ypsilanti Vulcanizing Co., Ypsilanti, Mich.

Western Tire & Battery Co., Hutchinson, Kan., has opened new quarters.

Auto Supply & Tire Co., Wichita, Kan., has moved to larger quarters.

W. D. Sheplow, Pawnee, Okla., has purchased the Oklahoma Tire & Equipment Co. from Henry Wilson.

The Mt. Diablo Tire Shop, Concord, Cal., has installed a vulcanizing plant.

Tire Service House, Bellingham, Wash., has leased the Panama Theatre Building and will remodel it.

The Miller Tire & Rubber Co. has appointed the Farrell Auto Supply Co., 1178 Bedford Ave., Brooklyn, N. Y., local distributor of its product.

TIRE NEWS

Size, Inflation Pressure and Construction of Tires*

By W. S. Wolfe

Perfect riding qualities would be experienced on an even, smooth roadbed under which conditions the tires and springs would not be brought into play. Conditions only approximate this at best so tires and springs are constantly acting to "iron out" the irregularities of the road, to decrease the vibration which is destructive to mechanical parts, and to relieve the discomfort of the passengers.

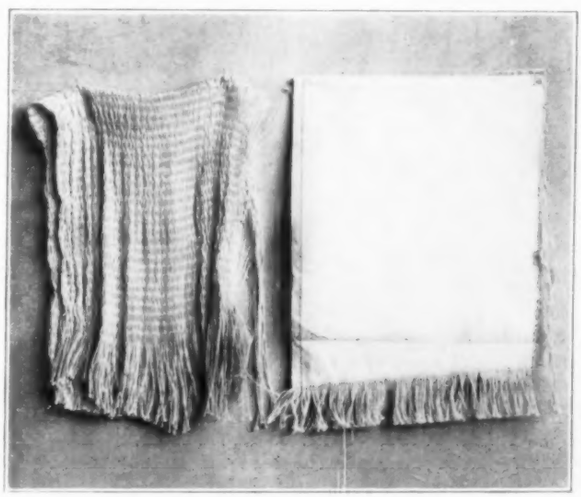
Road conditions vary from the roughest with chuck holes, ridges and bumps to the improved highways, which are the nearest perfect.

On the former only low speed is possible and the springs and tires are constantly in action; as we approach the latter high speeds are obtainable and the tires' function is to reduce the vibration to a minimum. So springs and tires necessarily work together as the following example shows.

The operation of a car equipped with pneumatic tires but with no springs on a bumpy unimproved road would result in great discomfort to the passengers. With such a car on an improved highway the passengers would hardly feel the small inequalities of the roadbed.

A car equipped with solid tires and well-designed springs would give good performance on the bumpy road, while on an improved highway at increased speeds the vibration would be great. The nearest approach to the ideal is a car with well designed springs and adequate sized pneumatic tires.

The two general and distinct types of tires on the market are solid and pneumatic. The solid tire has found its field in the motor truck, when the loads are heavy, the design substantial, and absolute dependability is necessary—all at a sacrifice of speed. Solid tires, since rubber is non-compressible, rely on this power to distort and regain original shape, to absorb road shocks. The standard types of solid tires are built to obtain economy and endurance of the tire itself rather than cushioning qualities. The cushioning quality varies with the height of the tire and is gradually decreased as the tire wears down. It also depends upon the degree of softness of the compound used, but the amount of cushioning thus obtained is limited because below a certain point the life of a tire decreases rapidly with any increase in softness of the compound. With the same height of tire, added width results in an increase of the cushioning qualities.



CORD DUCK

TYPES OF TIRE FABRICS

The public has recognized the shortcomings of the standard solid tire and has had the "bugaboo" of flat pneumatic tires, so that cushion tires have come on the market with varying success. The essential features are a softer compound used in greater quantity, and designs with such unique features as air chambers, overhangs, and notches to allow greater distortion of the rubber.

The pneumatic tire has already established itself on the passenger, motorcycle, bicycle and airplane. It has all but conquered on the light delivery vehicle, and the struggle for supremacy is about to start on heavy-duty trucks. The superiority is based not on lower cost per tire-mile, but on lower track-mile operating cost; this is affected by increased speed, increased radius of operation, decreased fuel consumption, and by the decrease in upkeep and depreciation. The re-design of the truck, which is bound to come in order to reduce the weight of the carrier as compared with that of load conveyed, will also be a factor in decreasing the operating cost.

The pneumatic tire has three types, clincher, straigh-side and quick-detachable clincher. Aside from the straight-side having a slight superiority because of increased air volume, the cushioning qualities are identical. Each type can be built in integral or two-cure construction without affecting the riding qualities.

The type of construction also aids in obtaining easy riding qualities. The standardized 17¼-oz. square-woven duck used for tire fabric is being replaced in the highest grade tires by a cord that varies in size from a two-ply cable to a multiple-ply cord built up in layers. The essential feature as regards cushioning qualities is that the tire with the cord construction resists bending to a much less degree and recovers itself more readily. At the same time less internal heat is generated and the power consumption is decreased. The fundamental principle is that a cord tire, because of its construction, can carry a given load with less air pressure and without fatigue or injury than can a fabric tire. A great gain in riding

* Paper read at Pennsylvania Section of S. A. E.

qualities results therefore from the use of cord tires.

A far more important point to the easy riding and life of the tire is the tire size and inflation pressure. The proper tire to carry a given load is important to both car owner and manufacturer. As soon as the owner finds his tire service is poor because of overloading he puts more air in his tires to carry the load and thereby loses the qualities which give easy riding.

The inflation schedule shows the amount of load and inflation under which a given size of tire works satisfactorily. For ideal performance the tire should be deflected from 10 to 12 per cent of the sectional height. This gives the best combination of durability and riding qualities.

Let us take an example of good practice. If a 1000-lb. load is to be carried, a 4-in. tire at 80-lb. pressure would give reasonable satisfaction, but would be hard and rebound at uneven places in the road. The owner, if not satisfied with the riding qualities, might decrease the pressure and gain easy riding at the sacrifice of durability. The life of the tire is thus impaired. The most satisfactory answer is to use a 35 by 4½-in. tire and to decrease the pressure to 67 lb. This gives the proper 10 to 12 per cent. deflection, and the tire is good for long service. The riding qualities have been wonderfully increased, because the tire at the reduced air pressure is flexible and adjusts itself to the unevenness of the road, thus transmitting none of the vibrations.

It is to the advantage of car manufacturers to equip as nearly as possible their cars with tires conforming to the sizes given in the table, or the car will enjoy the reputation of hard riding or that of a tire hog as the case may be. Overloading on original equipment has been practised to a considerable extent, but manufacturers are more and more beginning to appreciate the evil results. It is unfair to the car owner if the manufacturer uses an over-size tire as original equipment and does not leave any alternative in case the owner wishes to use larger tires without changing the rim and wheel equipment.

The inflation schedule, given in a paper delivered at .... easy riding into the tires and along with it he has put in more life and durability. He has made the tire over-size to such an extent that the actual section is from ¼ to ⅜ inch greater than the nominal. He gains the effect of an over-size and thus allows the use of lower air pressures, the recommended decrease being 10 per cent. To this over-size feature a great deal of the easy riding and endurance of the cord tire can be attributed.

The tire's overall diameter affects the riding qualities only slightly, but it is noticeable that as the roads improve the diameter decreases. This is shown by the fact that English and French tires are made in small diameters owing to the better highways.

The following is an extract from an article by P. W. Litchfield on History's Lesson to the Motor Truck, which appeared in the Nov. 10, 1917, issue of the *Scientific American*, and states clearly the reason for mounting heavy loads on air:

"With steel tires the bicycle made but slow progress; the adoption of the solid rubber tire gave it increased public usage, but the pneumatic tire made it a big industry. The use of the solid tire on carriages increased the comfort of riding, but the pneumatic tire allowed the carriage to go so fast with comfort and safety that the horse was outgrown and became too slow, the result being the substitution of the engine.

PNEUMATIC AIR SERVICE.—FIVE MAJOR TROUBLES VS. THE OPERATING CONDITIONS

1. Tread rubber wear.	each considered against	A. The load carried.
2. Separation between plies; and separation of tread from carcass.		B. The inflation pressure.
3. Fabric breaks; and blow-outs.		C. The speed.
4. Bead troubles.		D. The spring suspension.
5. Tube troubles.		E. The power of the engine.
		F. The condition of the road surfaces.
		G. The nature of the country.
		H. The weather.
		I. The temperament of the driver.

INFLATION AND LOAD TABLE FOR PNEUMATIC TIRES

Ination Pressure.	Section Diameter of Tires, Inches.— 3	3½	4	4½	5	5½	6	7	8	9	10	12
45	375	....	....	....	....	....	....	....	....	....	....	....
50	415	520	....	....	....	....	....	....	....	....	....	....
55	460	570	....	....	....	....	....	....	....	....	....	....
60	*500*	620	750	....	....	....	....	....	....	....	....	....
65	....	675	815	955	....	....	....	....	....	....	....	....
70	....	*725*	875	1,030	....	....	....	....	....	....	....	....
75	....	....	940	1,100	1,280	....	....	....	....	....	....	....
80	....	....	*1,000*	1,175	1,365	1,550	....	....	....	....	....	....
85	....	....	....	*1,250*	1,450	1,640	1,860	....	....	....	....	....
90	....	....	....	....	1,535	1,740	1,970	2,450	....	....	....	....
95	....	....	....	....	*1,620*	1,835	2,080	2,585	....	....	....	....
100	....	....	....	....	....	*1,930*	2,190	2,720	3,280	....	....	....
110	....	....	....	....	....	....	*2,410*	2,990	3,605	4,250	....	....
120	....	....	....	....	....	....	....	*3,260*	3,935	4,630	5,360	....
130	....	....	....	....	....	....	....	....	*4,260*	5,020	5,810	8,070
140	....	....	....	....	....	....	....	....	....	*5,500*	6,260	8,360
160	....	....	....	....	....	....	....	....	....	....	*6,710*	8,940
170	....	....	....	....	....	....	....	....	....	....	....	*9,800*
180	....	....	....	....	....	....	....	....	....	....	....	....

Maximum inflations are given in italics.

CORD TIRE MOUNTED ON TAYLOR RIM

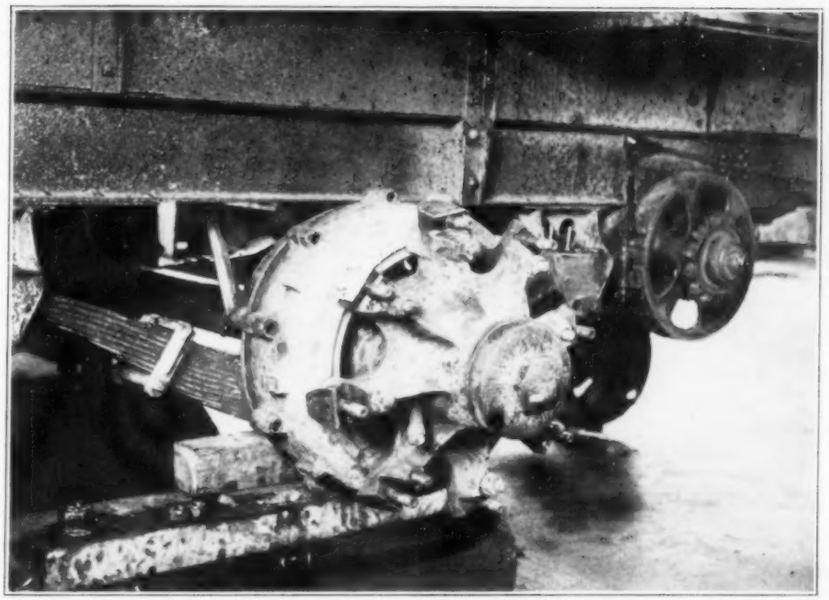
ANALYSIS OF CAUSES OF PNEUMATIC TIRE TROUBLES

1. Unsatisfactory tread wear.	caused by	Wheels out of alignment. Poor road surface conditions. Too much power. Improper use of brakes. Disintegration from oil. Skidding. Under-inflation. Cutting of tread rubber by sharp stones.
2. Separation between the plies of fabric; and between separation of the tread from the carcass.	caused by	Riding flat. Riding under inflated. Punishment on rough roads. Riding on car tracks. Water soaked. Overloading. Heating from speeding. Started by cuts.
3. Fabric breaks; and carcass blow-outs.	caused by	Overload. Under-inflation. Stone bruise. Flexing of the carcass fabric (after long service).
4. Bead troubles.	caused by	Under-inflation. Overloading. Bent rims. Injured in applying. Riding flat.
5. Tube troubles.	caused by	Leaky valves. Pinched tubes. Punctures. Riding flat. Heating from speeding.

"The automobile was made possible by the pneumatic tire. The internal combustion engine is a delicate mechanism. It has to be geared to the wheels in some form, hence the necessity of a perfect road, or of absorbing the shocks before they reach the wheels. The pneumatic tire performs this function most efficiently. The pneumatic-tired automobile replaced the horse-drawn carriage, because it saved time, went farther and faster. It increased the amount of travel and increased the distance traveled. Statistics show that now, after the few years of their existence, automobiles are covering as many passenger miles as the railroads; not that the railroads have suffered any great loss of business, but that the increase has been created and absorbed largely by the automobile.

"Following the passenger car came the light delivery truck, this replacing the horse-drawn truck, largely on pneumatic tires. Then we find the motor truck used in larger and heavier fields, still making an attempt to replace only the horse, and equipped with solid rubber tires, which had been practically abandoned on every other form of motor vehicle almost immediately after their adoption. Evidently the tire maker had not kept pace with the development of the truck or the truck builder was making a mistake. Up to now, the former is probably the case.

"It has long been known to the tire maker that compressed air with a durable container is the most efficient cushion and traction shoe for the wheels of an automobile. Also, that the load and cushioning quality depend merely on the volume and pressure of the air. If the product of volume and pressure is great enough, there is little fatigue and wear to a properly designed tire casing. The manufacturer of practical commercial pneumatic tires jumped from the 1½-in. bicycle tire to the 4½-in. automobile tire in a year or two and the latter has been the maximum size up to the present time.

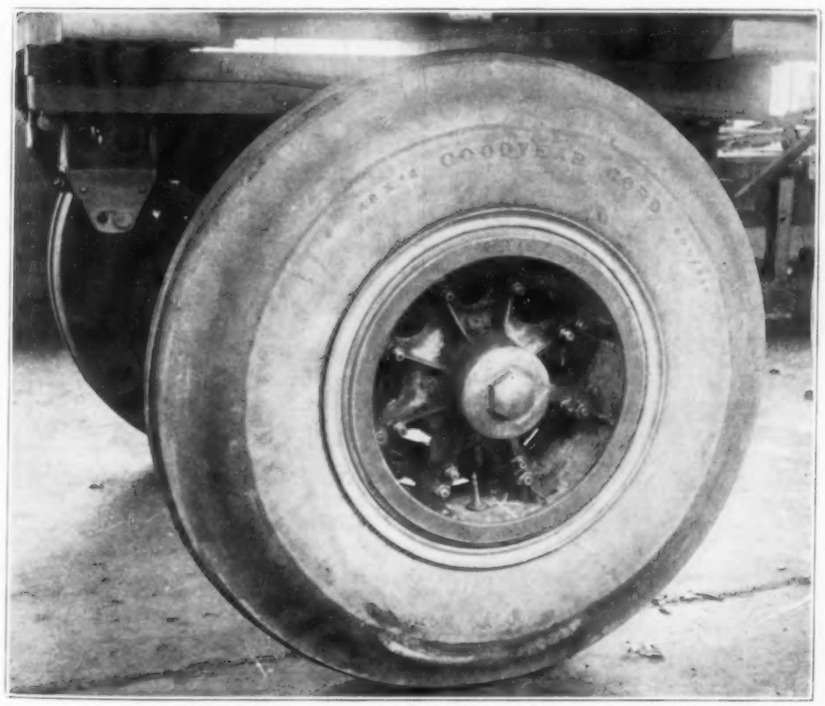


Spider and Brake Drum for Taylor Steel Wheel

The resistance of close-woven fabric to taking the form of a doughnut, its inability to stand the flexing and traction of greater loads, and the greater stretching and crimping given it in the larger sizes, seemed to establish the 4½-in. size as the limit.

"The progress of tire design during the last two years has shown that this limit no longer stands if, instead of woven fabric, laminated cords without cross weave are used. These cords take the strains without undue fatigue and we now see our way clear to pass from 4½-in. cross-section to 12-in. cross-section as easily as we went from 1½-in. to 4½-in. It is only a question of study to perfect the large pneumatics so that the truck can repeat the remarkable growth of the passenger car. Pneumatic tires up to 9-in. cross-section are now in successful commercial use on trucks and passenger buses. The speed of and the distance traveled by these vehicles have been increased and the upkeep costs reduced. The tire cost per mile may be higher than with solid tires, but this same is also true of passenger cars. A solid-tired touring car would have a tire mile cost of less than half that of one with pneumatics, but all other costs—fuel, upkeep and depreciation—would be higher.

"The first trucks designed for solid tires were lighter than those in use today, but the vibration caused so much breaking of parts that they have been strengthened and reinforced repeatedly. This can all be saved by using pneumatics, permitting lighter chassis and bodies to carry heavier loads. Also the traction of large single pneumatics is



Twelve-Inch Cord Tire on Taylor Steel Wheel

much greater than that of solids so that the trucks can be operated in sand, mud and snow, where the solid-tired trucks would be stalled. The gasoline and oil consumption is much less when pneumatic tires are used.

"The motor truck so far has only attempted to replace the horse in hauling merchandise because the solid tire has so limited its speed that it could not compete with any form of transportation requiring long hauls at higher speeds. When it can accomplish this, it so enlarges its field that it becomes a real competitor of the railroads."

Following the reading of the paper discussion was started on the various points brought up, resulting in several additional ideas. It was brought out that cord tires had numerous advantages over fabric tires, especially in the matter of easier riding qualities, less tread wear and less gasoline consumption. A cord tire and a fabric tire of the same diameter pumped to the same pressure showed that the cord tire bounced too much but that if the pressure was reduced ten pounds the results would be much more satisfactory. The tread wear on a fabric was anywhere from five to fifteen per cent greater than on a corresponding cord tire.

It was also brought out that larger wheels would tend to give easier riding qualities in a car. An interesting propheecy was made when the discussion turned to the location of the center of gravity. In order to keep this as low as possible the claim was made that in two or three years no cars will be built with tires larger than 32 x 4½ in.

Wire wheels were found to give greater tire mileage, but were not recommended for general use because they were found not to be good in many ways for the tire. The much-discussed subject of change in pressure due to an increase in temperature was brought up and it was shown that the increased temperature was not caused so much by the atmosphere but rather by the internal friction in the tire. Increases of 4½ lbs. have been recorded but it was not found that this increase affected the riding qualities of the car to any appreciable extent.

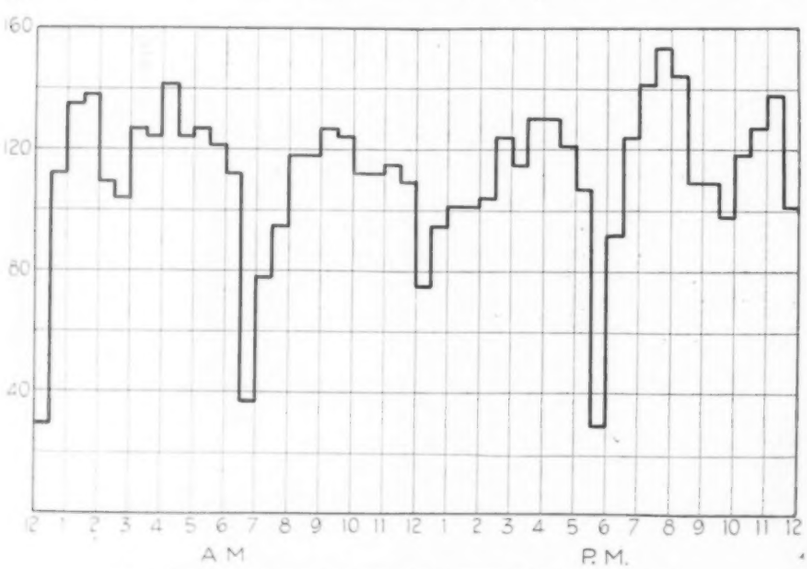
Load Characteristics of Tire Factory

The installation of the Ehman Tire & Rubber Co., Chicago, Ill., is an example of a medium-sized tire company from which data of a generally applicable character may be taken. All of the service is supplied at 220 volts, three-phase, 60 cycles, from the lines of the Commonwealth Edison Company. It is all utilized as alternating current except that energy required to operate a 90-hp. calender. Direct current for this machine is supplied by a 100-kw. rotary converter operating from the alternating-current supply. One calender is driven by an alternating-current motor, a departure from usual practice. Lighting is supplied through an auto-transformer connected so that all service will come through one meter and thus give the tire company the benefit of receiving a simultaneous maximum demand.

The table herewith is a complete record of the electrically driven apparatus at the plant of the Ehman company. It shows the connected electric load exclusive of lighting to be 750 hp. The curve reproduced shows the uniform character of the company's load. The maximum demand occurred between 7.30 p. m. and 8 p. m. and amounted to 153 kw., giving a demand factor of 27.2 per cent and a load factor of 74.7 per cent. The peak was only a few kilowatts above the usual demand. The total energy consumed in September, the month in which the demand curve was made, was 52,200 kw.-hr. During this month the company's output amounted to 500 tires a day, the tires including all of the more common sizes. It can also be shown that the energy consumption per tire was only 3.48 kw.-hr. and amounts to only a very small fraction of the tire cost. With the exception of three buffers and one cement mixer, for which the data could not be obtained, Gerenal Electric motors are used.—*Electrical World.*

DATA ON MOTOR APPLICATIONS

Type Machine	Type of Drive	Manufacturer	Size of Motor in Hp.
2 Mills	Gear	Birmingham	100.0
1 Mill	Gear	Birmingham	50.0
1 Mixer	Gear	Birmingham	75.0
1 Mixer	Gear	Birmingham	75.0
1 Hydraulic pump	Gear	Davis	7.5
1 Calender	Gear	Birmingham	50.0
1 Calender	Gear	Vaughn	90.0
2 Mills	Gear	Vaughn	35.0
1 Mill	Gear	Vaughn	100.0
1 Mill	Gear	Farrell	40.0
1 Mill	Gear	Birmingham	100.0
1 Tuber	Belt	Allen	5.0
1 Elevator	Belt	Otis	7.5
3 Buffers	Belt	.....	5.0
1 Labeling	Gear	.....	0.1
1 Experimental mill and calender	Gear	Vaughn	5.0
1 Cement mixer	.....	.....	5.0
2 Cove machines	Guard	Akron Rubber Mold	5.0
1 Cleaner	Belt	.....	3.0
1 Air compressor	Belt	Curtis	35.0
1 Bias shears	Belt	Birmingham	5.0
1 Tube wrapper	Belt	Akron Rubber Mold	2.0
1 Treadmill	Gear	Adamson	15.0
1 Rotary converter	.....	.....	100.0
Total.....			750hp.



LOAD CURVE OF TIRE FACTORY PRODUCING 500 TIRES A DAY

Howley Appointed President of Truck Association

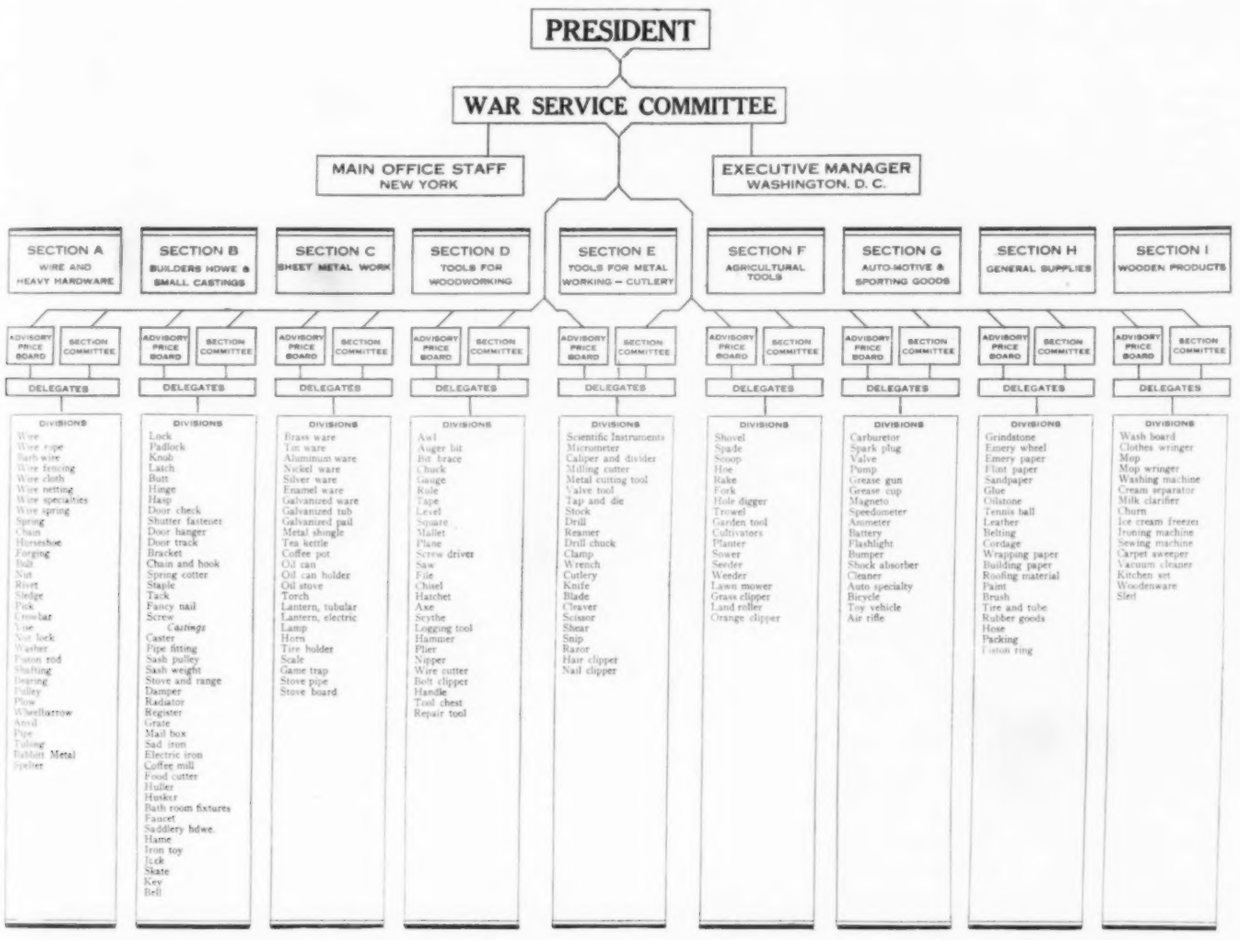
At the monthly meeting of the Philadelphia Motortruck Association, held recently at the Adelphia Hotel, Philadelphia, the following officers were elected: President, John D. Howley, of the White Co.; vice-president, Edward W. Burnshaw, Jr., of the Girard Automobile Co.; treasurer, W. Ross Walton, of the Firestone Tire & Rubber Co.; secretary, W. H. Metcalf, of George W. Houk Co. The board of directors consists of the following: O. W. Doolittle, of Foss-Hughes; J. Harry Schumacker, of the Dorris Co., and Thomas K. Quirk, of H. Kaiser & Co. The meeting was presided over by O. W. Doolittle.

Hardware Manufacturers Organize for War Service

American hardware manufacturers have been doing excellent work, individually, in helping the Nation prepare to win the war. Now they have formed a new organization to be known as the Hardware Manufacturers' Organization for War Service, which is calculated to make the industry a compact mobile body capable of giving the Government the service which is required for industrial co-operation in the great war programme.

The new organization was perfected at a special war convention of manufacturers of hardware, both members and non-members of the American Hardware Association, which was held on January 17 at the Biltmore Hotel, New York.

The Hardware Manufacturers' Organization for War Service is expected to render effective aid primarily to the Government and secondarily to its members, not only in respect to securing sufficient productive capacity at reasonable prices, but also in matters affecting priorities of supplies or of shipments of finished products and the determination of what industries in hardware are essential under war conditions. The following chart shows the organization:



Division Committees

Each line of manufacture, such as cutlery, saws, locks or washing machines, or suitable combinations of such lines, such as hammers and hatchets or bolts, nuts and rivets, will constitute a division. The manufacturers in each division will organize as they desire and elect a delegate to the section committee. They may elect a division committee if they desire as part of their organization.

Duties of Delegates

Delegates individually or through their division committee will

(*a*) Represent Division on Section Command with Government Agencies.

(*b*) Distribute orders among divisions which the Government is NOT ABLE *to place satisfactorily with individuals.*

(*c*) File with Executive Manager catalogues, prices, report of current capacity, time required to start delivery and maximum weekly or monthly deliveries in each major group of items in division.

Section Committees

Divisions similar to each other in their processes of manufacture or in their classes of consumers are combined into sections. Each section will be represented by a committee consisting of a delegate from each division or combination of divisions where desirable.

Each section committee may organize either with or without a paid secretary as it may determine.

Section committees will

(*a*) Distribute orders which
  (1) Members of one division cannot execute.
  (2) Which require equipment not possessed by any one division.

(*b*) Decide between conflicting interests of divisions.

(*c*) Take up with executive manager questions affecting whole sections.

Executive Manager

The Executive Manager will

(*a*) Consolidate requirements of the Government. Find sources of supply through
  (1) Delegate of Division.
  (2) Section Committee.

(*b*) Obtain priority for or prevent discrimination against as non-essential
  (1) Supplies for producers.
  (2) Shipments of products.

(*c*) Advise War Service Committee of developments of or changes in Government policy affecting the hardware industry, including

(1) Prospective increases in general requirements.
(2) Labor control or supply.
(3) General increase in production required.
(4) Taxation.

(*d*) Assist and advise War Service Committee in presenting to various Government agencies proposals affecting the hardware industry.

(*e*) Advise with and assist delegates or division committees regarding matters affecting divisions or sections.

(*f*) Have on file catalogues, price lists, and reports showing maximum current production of members.

To discharge above duties he will keep in daily touch with the Council of National Defense, Air Craft Production Board, Emergency Fleet Corporation, War Department, including Ordnance, Engineering, Signal Corps, Quartermaster, Forestry Service, Medical Departments, etc., Navy Department, Fuel Administration, Treasury Department, Department of Labor.

Advisory Price Boards

A small impartial board will be appointed by the President and War Service Committee for each section. The members of any board will not be directly interested in the product of the section they represent. Whenever any agency of the Government requests, or whenever there is evidence that the maximum prices for the articles in any division are unreasonably high, the Board representing that section will make an investigation and attempt to adjust such maximum prices to a reasonable basis through the voluntary concurrence of the members of the division. Failing to do this, they will report to the War Service Committee for such action as it may consider necessary.

War Service Committee

(*a*) Determine policy of organization.

(*b*) Direct activities of executive manager.

(*c*) Direct activities of and spur on section committees; decide between conflicting interests of sections.

(*d*) Take up questions affecting more than one section.

News of the Tire Industry

New Mason Cord Tire—Miller Service Plan—Reiss Carlisle Distributor—Motor Truck Tire Equipment—Kent Entertains Motor Transport—New Puncture-Proof Tire—Ideal Builds—Kelly-Springfield Branch Changes

New Mason Cord Tire

As soon as the necessary equipment has been installed in its plant, the Mason Tire & Rubber Co., will begin the manufacture of its new Mason cord tire. The new tire, which has undergone exhaustive trials on test cars, is cured by the air-bag process, which has proved the most effective manner of building a cord tire. A special mold to accommodate the air-bag is made, and as the heat rises in the mold, the air in the bag expands, stretching the cords strongly against the outer mold so that they attain a perfect balance. The company states that the use of the air-bag cure eliminates the possibility of puncture.

The new Mason cord tire is oversize and is built in a very attractive non-skid tread, consisting of the letter "M" set sidewise across the full length of the tread, the letters being turned successively in opposite directions. The ribbed tread design will also be manufactured in the cord. The color scheme is interesting. The top is jet black, the side walls cream colored, with a green stripe between the black top and the cream-colored side wall.

This tire will carry a high mileage guarantee because the company has the greatest faith in its performance. The company states that all the knowledge of experts who have years of successful effort behind them has gone into these tires. In the tests, Packard Twin-Sixes were used, and the cars were run 300 miles per day and were kept running day and night. The tests covered a period of over eleven months, and no expense was spared to produce a tire of the highest quality.

Miller Tire Service Plan

According to C. S. Norris, manager of the tire service department of the Miller Rubber Co., Akron, Ohio, the company's new plan entirely eliminates the motorist's tire repair bills. No matter where, within the city limits, the motorist meets with an accident to his tires, the Miller Service car will reach him promptly in order to make the needed repairs.

Reiss Takes Over Sale of Carlisle Tires

Charles E. Reiss, Hupmobile distributor, has become wholesale distributor for the Carlisle Cord Tire Co., and will trade as the Carlisle Cord Tire Sales Co. The new company, which is not incorporated, will function in a large part of the Eastern territory, including New York City and parts of Pennsylvania, New Jersey and Connecticut. The acquisition of the tire business will not in any way interfere with Reiss's Hupmobile interests or business.

Motor Truck Tire Equipment

New evidences are received daily of the great part motor truck transportation is playing in relieving the unprecedented traffic congestion that has all but overwhelmed the industrial and domestic life of the country. Those who are more or less acquainted with the great traffic needs of the future are viewing with alarm the momentum which transportation problems have gathered, and the unmistakable rapidity with which traffic needs are overtaking railroad facilities. The fact can be disguised no longer that even under government operation the railroads cannot handle the traffic of the nation. They are simply overwhelmed—and no greater proof need be cited than the Government's five-day's business suspension order and the ten-week program of heatless Mondays, the real cause of which is a shortage of cars to handle the coal needs of the nation.

A practical application of the motor truck to our present traffic problems is found in the fleet of express trucks which has been operating for the past ten months between the Goodyear Tire & Rubber Co.'s plant in Akron and eastern points, with Boston as the terminal.

The difficulties in maintaining this service during the present winter season, which is the most severe known in the East for a score of years, have been all but insurmountable, but the line has been kept in operation, with no other inconvenience than an ocasional delayed trip.

The secret of the success of the Goodyear motor truck line lies largely in the tire equipment. The trucks are shod with big cord tires which form a cushion for the load, protect the mechanism of the truck and permit much greater speeds than can be obtained on solid tires. Punctures are almost unknown, as the carcass and tread rubber are very thick. Some of these big tires have journeyed 9000 miles with no other attention than the maintenance of proper air pressure.

Kelly-Springfield Profits $2,700,000

The Kelly-Springfield Tire Co., New York, has just closed its most prosperous year with net sales agregating $14,000,000, and profits, before deducting taxes, of $2,700,000. Allowing $210,000 for the preferred dividend, almost $2,500,000 remains for $5,000,000 common stook—a return of 50 per cent, or $12.50 a share. After the war tax is deducted the profits of the company will be about the same as those for 1916, and approximately equal to the total sales of the company five years ago. More than 2200 pneumatic tires, it is claimed, are being turned out daily, as compared with 1400 a year.

Motor Transport Entertained at Kent

Company 5, 308th Motor Supply Train, Quartermasters Department of the States Army, was held up at Kent, Ohio, recently by a severe snow storm, while it was on its way from Detroit to the coast with a large number of Liberty Trucks for use by the United States Army overseas. The boys were entertained, during their stay in Kent, by the Mason Club, which is the social center of the Mason Tire & Rubber Co.

To Make Puncture-Proof Tire

The Sherman-Stiveson Tire & Rubber Co., has been incorporated and has purchased the buildings of the F. A. Black Manufacturing Co., in North Scottdale, Pa. As soon as the necessary repairs shall have been made and machinery installed, the company, it is stated, will manufacture a puncture-proof tire made entirely of fabric and rubber, without wire or inner tube. The new tire is built with a removable tread and can be retreaded and renovated a number of times.

Ideal Building

(Special Akron Correspondence.)

The Ideal Tire and Rubber Co. is building a new plant at Cleveland, Ohio. The plant will take in a twenty-five acre tract of land on the Warner road adjacent to the Erie and Pittsburg road.

The building will cover 96 x 225 ft. of land and is to be three stories high. It will be modern in every detail of equipment for the manufacture of rubber.

The tire sales force is already being organized. The company expects to be making tires within a few months.

Kelly-Springfield Cincinnati Branch Changes

Changes in the Cincinnati branch of the Kelly-Springfield Tire Co. have resulted in the creation of a carriage tire division, which will be under the direction of Howard Cox, formerly manager of the branch.

Mr. Cox has been identified with the Kelly-Springfield Company from the days when its sole product was carriage equipment, and is thoroughly familiar with this end of the business. D. E. Volker, who for the past five or six years has sold tires for the Cincinnati branch, becomes branch manager.

Items of Interest to Tire Trade

New Hartig Sales Plan—Tires Are "Accessions"—Goodrich Guide Posts—Globe Improvements—Trackless Trolleys on Rubber Tires—Batavia Has Gray Tread—Lane Joins Mulford, Haas—Kelly Opens in Omaha

Hartig Company's New Sales Plan

The Hartig Tire & Ruber Co., Washington distributor for Ajax tires, has recently inaugurated a sales plan, which while entirely wholesale, includes some novel features. Under the new plan all tire sales made in the salesroom of the Hartig company are credited not to the distributor, as is now the case, but to some dealer in that city. Under no circumstances does the company take credit for a sale.

In discussing the new plan, Frank Fickling, sales manager of the company, said: "We are wholesale distributors exclusively. We never vary from that idea. There are no exceptions to the rule. We give the motorist who wants an Ajax tire or tires every courtesy, but the profit of the sale goes to one of our dealers in Washington. The dealer located nearest to the motorist's home or garage is credited with the sale, which is immediately charged off on our books."

Tires are "Accessions"

The Supreme Court of Tennessee recently ruled that if the purchaser of an automobile on the partial payment plan applies accessories to the car and later loses the car by attachment for nonpayment the accessories go along too. In the case in Tennessee the car buyers put new tires on the car, paying cash for them. The court held, however, that the accessories were "accessions," or permanent improvements made upon mortgaged property, and not subject to recovery.

In handing down his decision the judge said: "We think it must be laid down as a general principle that that mortgagor in making repairs on property which he had mortgaged must be held, in the absence of some distinct evidence to the contrary, to have intended such repairs as fixed improvements to such property."

Goodrich Erects More Guide Posts

The Goodrich National Touring Bureau has linked up another artery for use by motor trucks this year by guide-posting the 182-mile road between New York City and Pittsburgh, Mass. Especial care has been used to simplify routing on this great highway, as it promises to receive a heavy flow of motor traffic from the mills at Pittsburgh, the home of many industries. Reports had reached the Goodrich Co. that manufacturers had been buying enormous numbers of motor trucks through fear of paralysis of the railroad system in that locality, and overtures had been made Massachusetts highway commissions to mark roads. This has just been completed after several months of steady labor.

Globe Makes Improvements

J. C. Matlack, the new president of the Globe Rubber Tire Mfg. Co., recently announced that the company's increased business has made necessary an improved and larger factory equipment. The company, therefore, has closed its plant at Trenton temporarily.

Mr. Matlack feels that this can be done more economically now because of the shortage of fuel and the partial idleness enforced by the order of Dr. Garfield. Mr. Matlack expects that the factory will be able to resume within a few weeks and that its capacity will have been enlarged 50 per cent in the interim.

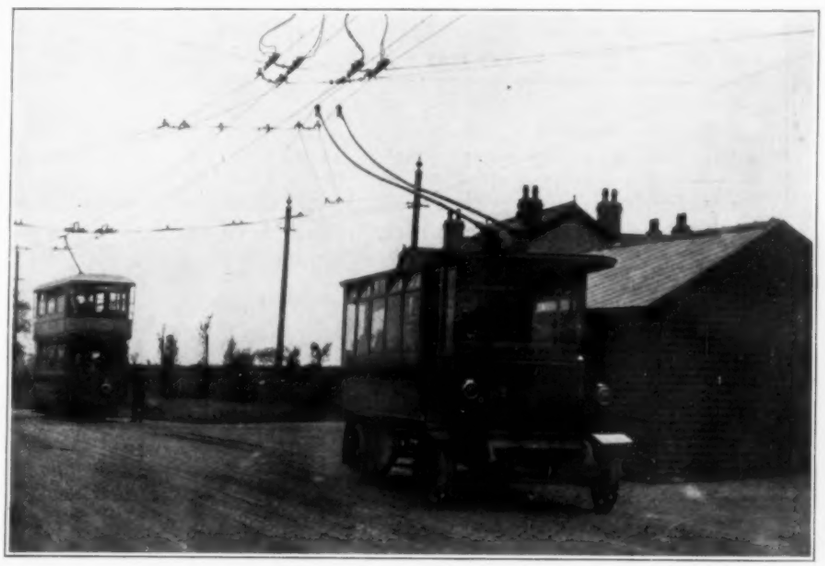
Hood Adds to Factory

The Hood Rubber Co., Nichols Avenue, Watertown, Mass., is building a one-story 40 x 120 ft. concrete factory, which will cost approximately $30,000.

Batavia Adopts Gray Tread

In order to produce a tire, which will more nearly match standard tires of other makes, the Batavia Rubber Co., Batavia, N. Y., is substituting gray for its present red tread tires, both in the Security and Rib types. This move was determined upon in response to a popular demand, and probably the change will further increase sales.

It is claimed that the company is flooded with orders to such an extent that it is now running night and day.



Trackless Trolleys on Rubber Tires

Several European and South African cities and also Shanghai, China, have trackless trolleys in service on lines where tracks would be impractical on account of their high cost of installation. The principle of propulsion is very similar to that of the ordinary electric street car, but in place of the usual car running on steel rails, the trackless trolley runs on rubber tires and is capable of being steered freely. These trolleys carry both passengers and freight and in most cases the wear of the rubber tires is much less than was anticipated. In Shanghai, for instance, the cars were originally equipped with a number of different makes of tires for experiment; the minimum mileage for these was about 13,000 miles, and there are two tires still in service after having run nearly 50,000 miles. The photograph reproduced was kindly furnished by the Bureau of Foreign and Domestic Commerce, Washington, D. C.

H. A. Lane Joins Mulford, Haas Co.

H. A. Lane, manager of the Brooklyn, N. Y., branch of the Firestone Tire & Rubber Co., has been appointed manager of the tire department of the Mulford, Haas Co., the Brooklyn distributors of Ford cars. Mr. Lane has been connected with the tire business for a number of years. The service plans of the Mulford, Haas Co. include free tire service to motorists in Brooklyn and New York at all hours and on Sundays and holidays. Ten service cars have been equipped and are in charge of expert tire men, who will be at the command of all motorists at a moment's notice.

Keaton Co. Takes Lease

The Keaton Tire & Rubber Co., Akron, Ohio, has closed a lease for a corner store with basement in the Congress Hotel, Portland, Ore.

This will be a factory branch and at present will be used as the northwestern distributing center. J. S. Tormey will be the local manager.

Owen Co. to Build

The Owen Tire & Rubber Co. Bedford, Ohio, is having plans for a fireproof factory prepared through W. C. Owen & Co., architects, Cleveland.

Kelly-Springfield Opens in Omaha

A sales depot and service station, in charge of Geo. W. Hiett, under the jurisdiction of the Chicago branch, has been established at 2046 Farnam street, Omaha, Neb., taking over the wholesale distributions of tires formerly handled by the Kelly-Springfield Omaha Co.

Tubeless Tire to Enlarge Plant

The Tubeless Tire & Rubber Co., Millersburg, Ohio, will receive bids about March 1 for a 2 story, 50x100 ft., frame addition to its plant, at an estimated cost of $8,000.

Establishes Truck Service

To help relieve the freight congestion, the Mason Tire & Ruber Co. have established truck service between Kent, Ohio, where the factory is located, and their distributor at Pittsburgh, Pa., and tires are regularly forwarded by trusk to that point.

Eimer & Amend Purchase New Plant

Eimer & Amend, manufacturers of laboratory supplies have purchased a plant in Newark, N. J., which they intend to alter and improve for manufacturing chemicals.

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The membership of this publication in the Associated Business Papers, Inc. (the International Association of Class, Trade and Technical Papers), means that it has achieved an exceptionally high publishing standard, and has subscribed unreservedly to these—

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The publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself.

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups;" to keep his reading columns independent of advertising considerations and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

If you have read the foregoing standards, there is not much left to be said, except to tell you that these principles are *present day realities* and not merely beautiful ideals for future attainment.

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Classified Buyers' Index To Rubber Factory Equipment

Below is printed an alphabetical list of the principal machinery and other equipment used in rubber factories, compiled from information supplied by the manufacturers. The key symbols placed after the items refer to the names of the manufacturers that make them, as shown in the list of Manufacturers of Rubber Factory Equipment, that is printed elsewhere on this page.

Accumulators, A11, B23, F3, T31, W31.
Autoclaves, A11, B31, D15, E11, S55.
Balances, B7, E11, S19, T27.
Bins, Stock, O3.
Blocks, **Pillow,** A11, F3, T43.
Blowers, Tube Splicing, G3.
Boilers, Steam, S31.
Boosters and Exhausters, A3.
Boxes, Compound, O3.
Brands, Aluminum, D19.
Brakes, T43.
Brushes, O7.
Buckets, D27.

Cages, D27.
Calenders, A11, F3, S31, T43.
Calenders, Embossing, F3, H11, T19, T43.
Cars, **Shoe,** O3.
Carton Filling Machines, W23.
Carton Making Machines, W23.
Castings, A11, B3, B23, B31, D27, F3, M3, T31, T43, W31.
Chemical Apparatus, B31.
Chucks, S47.
Clutches, **Brake,** F3, T43.
Clutches, Friction, F3.
Clutches, **Magnetic,** F3, T43.
Compressors, Air, S31, T31.
Condensers, D15, S55, T31.
Conveyors, D27.
Cores, **Tire,** A11, B3, T31, J3.
Couplings, **Power,** T43.
Crackers, **A11,** F3, T43.
Cranes, D27.
Cutters, Baby Carriage Tire, W23.
Cutters, Band, A11, E2, H31, R7.
Cutters, Bias, W23.
Cutters, Duck Plug, W23.
Cutters, Gaskets, A11, H11, H31.
Cutters, Raw Stock, W23.
Cutters, Rubber Stock, H19, H31, R7, T11.
Cutters, Scrap, A3, T11.
Cutters, Strip, E3, F3.
Cutters, Tubing, W23.

Devulcanizers, B11, D15.
Dies, A11, D19, H11, D19.
Die Sinking, A11, D19, H11.
Dies, Cutting, D19, H11.
Digestors, D15.
Dipping Machines, O3.
Doubling Machines, F3, T43.
Doubling Machines, Fabric, T17.
Drills, D27.
Drives, A11, D27, F3, T43.
Drives, Chain, D27, F3, T43.
Drives, **Motor,** A11, D27, F3, T43.
Drums, Bead, A11, T31.
Drums, Tire Machine, G3.
Drums, Tread, A11.
Dryers, A35, B31, D15, H27, S31, S55.
Dryers, **Fabric,** C51, D15, T19, T43.
Dryers, Rubber, D15.
Dryers, Vacuum, D15, S55.
Dynamometers, S19.

Engines, Steam, S31.
Engraving Machines, Hard Rubber, A11.
Experimental Outfits, A11, B3, D15, D19, E11, F3, T43.
Extractors, E11.

Fittings, Hydraulic, A11, B23.
Fittings, Water, A11.
Folders, Belt, F3.
Forms, Dipping, D19.

Gages, Pressure, B23, S7.
Gages, Recording, S7.
Gages, Thickness, H11.
Gears, A11, F3, M23, T43.
Governors, Pump, M15.
Grinders, A11, F3, S47, T43.
Grinders, Hard Rubber Dust, A3, A11, F3, R3, T43.

Hammers, Steam, B31.
Hangars, D27, M27.
Hoists, D27.
Holders, Form, O3.
Hooks, Tire, D27.
Hose Machines, F3, R27.
Hydraulic Machinery, A11, B23, F3, H19, T43, W31.
Hydrometers, T7, T27.
Ice Machines and Equipment, D27.
Impregnators, B31, D15, F3, S55.
Instruments, Recording, S7, S19.
Insulating Machines, R27.
Joints, Expansion, A11, B23.
Kettles, A11, B31, D7, D15, S31, S55.
Knives, H31, J7, R7, T43.
Knives, Calender, R7.
Knives, Jar Ring, R7.
Knives, Mill, R7.
Knives, Tapping, R7.

Laboratory Apparatus, D7, D15, E11, F3, R27, S15, S19, T27.
Ladders, Rolling, M27.
Lathes, Hard Rubber, A11, S47.
Lathes, Jar Ring, A11, T31, W23.
Lathes, Wrapping, A11.
Lockers, O3.
Looms, Hose, R27.

Magnets, D23.
Mandrels, A11.
Markers, Shoe, H11.
Microscopes, E11, T27.
Mills, Grinding, A3, A11, E11, F3, R3, D7, T43.
Mills, Mixing, A11, D7, F3, T43, W7.
Mills, Paint, D7, R3.
Mills, Washing, A11, F3, T43, W7.
Mixers, Solution, D7, W7.
Molds, Hose, A11.
Molds, Mechanical, A11, D19, H11, H19, M3, T15, J3, D19.
Molds, Sole and Heel, D19, J3, D19.
Molds, Sundries, D19, H11, J3, D19.
Molds, Syringe Bag, D19, J3, D19.
Molds, Tire, A11, B3, T31, J3, D19.
Molds, Toy, D19, J3, D19.
Molds, Water Bottle, D19, J3, D19.
Motors, D27, E11, T43.

Name Plates, H11.

Pattern Making, A11, M3, T43.
Percolators, D7, D15, E11, S55.
Plaiters, W23.
Plantation Machinery, F3, T43.
Plants, Aniline Oil, D15.
Presses, Baling, B23.
Presses, Bead, A11, B23, F3, W31.
Presses, Belting, A11, B23, F3, T43, W31.
Presses, Blocking, B23.
Presses, Filter, A3.
Presses, Forcing, A11, B23, T43, W31.
Presses, Hand, A11, B23, E11, F3, H19.
Presses, Heater, A11, B11, F3, W31.
Presses, Hydraulic, A11, B23, F3, H19, T19, T31, T43, W31.
Presses, Plate, A11, B23, F3, W31.
Presses, Sheeting, A11, B23, F3.
Presses, Shoddy, A35.
Presses, Tire Setting, A11, B23, W31.
Presses, Vulcanizing, A11, B11, B23, F3, T31, W31.
Pulverizers, A3, D7, E11, R3.
Pumps, A3, A11, E11, M27, S31, T31.
Pumps, Centrifugal, T31, W31.
Pumps, Hydraulic Pressure, A11, B23, S31, T31.
Pumps, Spray, M27.
Pumps, Vacuum, A3, B31, D15, E11, S31, S55, T31.

Racks, Drying, D7, D27.
Racks, Shoe Car, H11, O3.
Racks, Tire, D7, D27, O3.
Railways, Industrial, D27.
Reclaiming Machinery, B11, D7, F3, R27, S55, T43.
Refiners, A11, F3, T43.
Regulators, Damper, M15.
Regulators, Pressure, D3, M15, T7.
Regulators, Pump, M15.
Repair Equipment, Tire, B11.
Riveters, W31.
Rollers, Hand, B3, H11, H19.
Rollers, Strip, B3.
Rolls, A11, F3, T43.
Rolls, Chilled, A11, T43.
Rolls, Cooler, F3.
Rolls, Engraved, F3, H11.
Rolls, **Mill,** A11, F3, T43.
Rolls, **Sand,** A11, F3, T43.
Rolls, Steel, F3.
Rolls, Wood, G3.
Safety Appliances, D27, F3.
Scales, B7, D27.
Screens, D7, O3.
Screw-Downs, Calender, A11, T43.
Separators, Air, R3.
Separators, Magnetic, D23.
Separators, Water, A35.
Shafting, A11, D27, F3, T43.
Shears, Hand, J7.
Shears, Power, F3.
Shells, Belting, G3, C55.
Shells, Calender, C55, O3
Shells, Stock, G3, C55.
Sifters, D7.
Sifters, Brush, D7.
Slitting Machines, F3.
Skivers, J7, R7.
Solvent Recovery Apparatus, B31, D15, S55.
Special Machinery, J3.
Spreaders, A11, F3, T43.
Sprockets, D27, M23, T43.
Stamps, Steel, D19, H11, D19.
Stands, Tire, A11, B3, T31.
Starters, Motor, T43.
Sticks, Shoe, H11, O3.
Stitchers, B3, H11.
Stops, Safety, D3, D27, F3, T43.
Strainers, A11, R27.
Stretchers, Belt, A11, F3, T19, T43.
Stretchers, Hydraulic, A11, F3, T43.
Switches, Electrical, D27, T43.

Tables, Calender, O3.
Tables, Cooling, D27, O3.
Tables, Tire Conveying, O3.
Tanks, Acid, B11, D15, S55, T19.
Tanks, Soaking, B11, S55, T31.
Testing Machines, B11, S19.
Thermometers, E11, S7, T7, T27.
Tire Making Machines, B3, R27, T31.
Tire Tread Machines, R27.
Tire Wrapping Machines, Cloth, T15, T31, T43.
Tools, Fountain Pen, S47.
Tools, Rubber Workers', H11, H31.
Tramways, Overhead, D27, O3.
Transmissions, A11, D27, M23, T43.
Traps, Steam, D3.
Trimmers, W23.
Trolleys, D27.
Trucks, Industrial, D7, D27.
Tube Wrapping Machines, A11, T43.
Tubing Machines, A11, R27.

Valves, Float, M15.
Valves, Hydraulic, B23, D27, T31, W31.
Valves, Reducing, D3, D27, M15.
Vulcanizers, A11, B11, D15, T31, W31.

Washers, A11, D15, F3, T43.
Washers, Beater, T43.
Washers, Tub, D7, F3, T43.
Wheels, Buffing, O7.
Wheels, Roller Bearing, D27.
Wire Drawing Machines, T43.
Wiring Machine, Hose, A11.
Wrapping Machines, A11, T15, T31.

Manufacturers of Rubber Factory Equipment

THE RUBBER AGE AND TIRE NEWS will gladly supply information regarding the addresses and products of the following manufacturers of Rubber Factory Equipment.

The advertisements of concerns whose names appear in bold face type will be found in this issue of THE RUBBER AGE AND TIRE NEWS.

A 3—Abbe Engineering Co.
A 7—Adams, John J.
A 11—Adamson Machine Co.
A 15—Adamson Mfg. Co.
A 19—Air Utilities Co., Inc.
A 23—Akron Rubber Mold & Machine Co.
A 27—Allen Machinery Co.
A 31—Alvey-Ferguson Co.
A 35—American Process Co.
A 39—American Rotary Valve Co.
A 43—American Tool & Machine Co.
A 47—Arthur Vulvanizing Machine Co.
B 3—Banner Machinery Co.
B 7—Becker, Christian, Inc.
B 11—Biggs Boiler Works Co.
B 15—Birmingham Iron Foundry. See Advertisement on Page 420.
B 19—Bonnett Co.
B 23—Boomer and Boschert Press Co. See Advertisement on Page 460.
B 27—Bristol Co.
B 31—Buffalo Foundry & Machine Co.
C 3—Cameron Machine Co.
C 7—Cell Drier Machine Co.
C 11—Champion Shoe Machine Co.
C 15—Chernack Mfg. Co.
C 19—Chicago Mold & Machinery Co.
C 23—Edred W. Clark.
C 27—Colonial Sign & Insulator Co.
C 31—Continental Rubber Works.
C 35—Cox, Geo. P., Last Co.
C 39—Crane Co.
C 43—Curtis & Marble Machine Co.
C 47—Cutler-Hammer Clutch Co.
C 51—Cutter, G. A., Sales Agent.
C 55—Cylinder Mfg. Co.
D 3—Davis, G. M., Regulator Co.
D 7—Day, J. H., Co.
D 11—De Mattia Bros.
D 15—Devine, J. P., Co.
D 19—Die Sinking & Machine Co.
D 23—Dings Magnetic Separator Co.
D 27—Duncan, J., Co.
E 3—Eastman Machine Co.
E 7—Eggers, William, & Sons.
E 11—Elmer & Amend.
E 15—Esterline Co.
F 3—Farrel Foundry & Machine Co. See Advertisement on Page 418.
F 7—Ford Chain Block & Mfg. Co.
G 3—Gammeter, W. F. See Advertisement on Page 460.
G 7—Garvin Machine Co.
G 11—General Electric Co.
G 15—Goodnow, L. H., Foundry Co.
H 3—Hartford Special Machinery Co.
H 7—Haywood Tire & Equipment Co.
H 11—Hoggson & Pettis Mfg. Co. See Advertisement on Page 457.
H 15—Hollander & Johnson.
H 19—Holmes Bros.
H 23—Housatonic Machine & Tool Co. See Advertisement on Page 462.
H 27—Hunter Dry Kiln Co. See Advertisement on Page 455.
H 31—Hyde Manufacturing Co. See Advertisement on Page 457.
J 3—Jones & Kuhlke. See Advertisement on Page 462.
J 7—Judson Cutlery Co.
K 3—Knott, L. E., Apparatus Co
K 7—Kohl Mfg. Co.
L 3—Lander Last Co.
L 7—Landis Machine Co.
L 11—Lenz & Naumann.
L 15—Link Belt Co.
L 19—Lloyd, John, Co.
L 23—Lobdell Car Wheel Co.

Manufacturers of Rubber Factory Equipment—Continued

M 3—McFarland Foundry & Machine Co.
M 7—McGrory, Philip.
M 11—Mahlow & Wykoff.
M 15—Mason Regulator Co.
M 19—Miller, Chas. E.
M 23—Morse Chain Co.
M 27—Myers, F. E., & Bro.
N 3—New England Butt Co.
N 7—Norton, M., & Co.
O 3—Ornamental Iron Works Co.
O 7—Osborn Mfg. Co.
P 3—Pierce Wrapping Machine Co.
R 3—Raymond Bros., Impact Pulverizer Co.
R 7—Richard Co., Inc., Stephen.
R 11—Riehle Bros., Testing Machine Co.
R 19—Ross, Charles, & Son Co.
R 23—Rossman, Roy G.
R 27—Royle, John, & Son.
S 3—Sargent, E. E., & Co.
S 7—Schaefer & Budenberg Mfg. Co.
S 11—Schuchardt & Schutte.
S 15—Scientific Materials Co.
S 19—Scott, Henry L., & Co.
S 23—Sessions, J. H., & Sons.
S 27—Shaler, G. A.
S 31—Shartle Machine Co.
S 35—Shoe Hardware Co.
S 39—Singer Sewing Machine Co.
S 43—Smith-Backmann Machine Co.
S 47—Smith Co., James M.
S 51—Southwark Foundry & Machine Co.
S 55—Stokes, F. J., Machine Co.
S 59—Summit China Co.
T 3—Tagliabue Mfg. Co.
T 7—Taylor Instrument Co.
T 11—Taylor, Stiles & Co.
T 15—Terkelsen & Wennberg.
T 19—Textile Finishing Machine Co. See Advertisement on Page 461.
T 23—Textile Machine Co.
T 27—Thomas Co., Arthur H.
T 31—Thropp's, John E., Sons Co.
T 35—Trefethen, F. L.
T 39—Troemner, Henry.
T 43—Turner, Vaughn & Taylor Co. See Advertisement on Page 464.
U 3—Utility Mfg. Co.
V 3—Venn, Frank.
W 7—Werner & Pfleiderer Co.
W11—Westinghouse Electric Mfg. Co.
W15—Williams Foundry & Machine Co.
W19—Williams Patent Crusher & Pulverizer Co.
W23—Wills, Arthur J.
W27—Wolff Co.
W31—Wood, R. D., & Co.
W35—Work, Joseph W.

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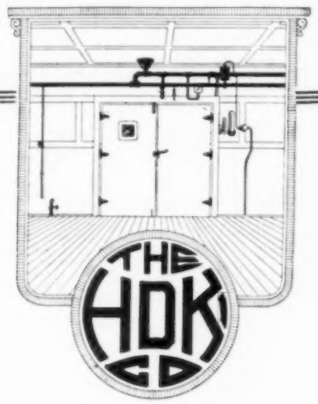

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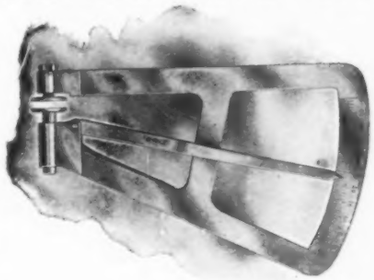

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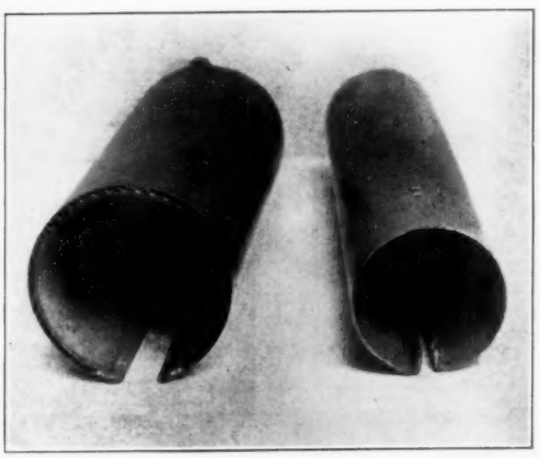

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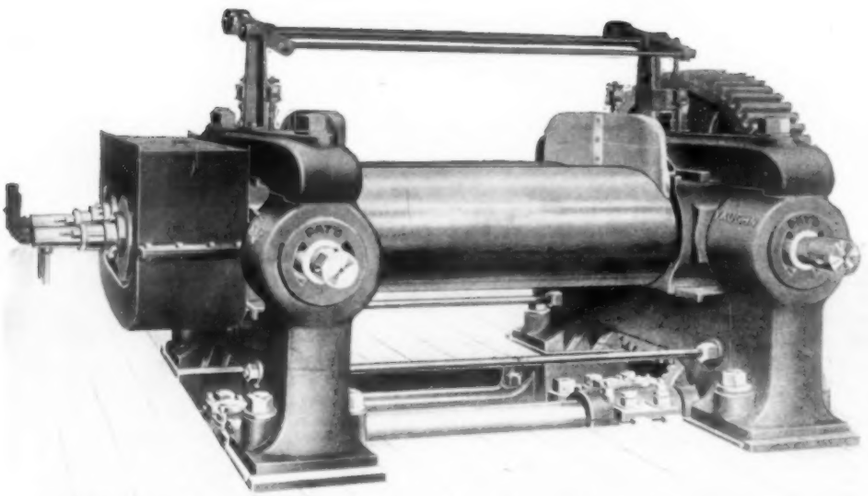

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